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ABSTRACT

This publication describes a pilot program involving 40 women scientists. It consisted of visits to 110 high schools in the United States. Each visit consisted of some of the following activities: (1) a large group meeting of tenth-grade female students; (2) meetings with individual classes; (3) seminars for approximately 30 female students; (4) meetings with school personnel; (5) informal chats with students; and (6) an informal meeting with the school principal or contact person. This document presents an overview of the program, and describes the selection of the high schools to be visited, the selection of the women scientists, the conduction of the meetings, the evaluation of the program, and recommendations for future programs. (BB)

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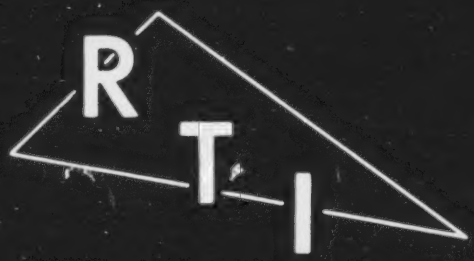

RESEARCH TRIANGLE INSTITUTE

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The Visiting Women Scientists Pilot Program
1978
Final Report

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I. INTRODUCTION

One of the responsibilities of the Science Education Directorate of the National Science Foundation is to develop and test methods of increasing the participation of women in careers in science. In fiscal year 1976 NSF inaugurated a Women in Science Program which consists of three components: (1) Science Career Workshops for women undergraduate and graduate students in science, (2) Science Career Facilitation Projects for women who wish to reenter careers in science, and (3) a Visiting Women Scientists Project for high school students.

In June 1977 the Center for Educational Research and Evaluation of the Research Triangle Institute (RTI) in North Carolina was awarded a contract to design a Visiting Women Scientists Program to motivate women students at the secondary level to consider and pursue careers in science and technology.

The design phase included the development of (1) a roster of women scientists, (2) a logistical plan for scheduling and conducting visits, (3) materials to be used in the program and (4) plans for evaluating the program. Feedback from a 5-member Advisory Panel was used in revising the plans for the pilot program, and the forms and procedures to be used in the program were approved by the Office of Management and Budget. A complete description of the planning activities can be found in the Phase I Final Report.[1]

The objectives established for the Visiting Women Scientists Program were:

1. To provide an opportunity for high school students to meet and interact with women scientists as role models.

2. To provide examples of women in a variety of science careers.

3. To provide evidence of women who have combined personal lives and successful careers in a variety of ways.

4. To provide information about the importance of science and scientists in solving world problems.

5. To provide information about science and technology job opportunities for women in the future (including emerging careers), and equal opportunity laws and affirmative action programs which guarantee women access to these opportunities.

6. To provide information about the preparation needed for various science careers, the importance of keeping various options open, and the sources of financial aid which are available for obtaining this preparation.

7. To encourage teachers and counselors to provide support and encouragement to women who are considering science careers.

8. To promote the attitude among both males and females that science careers are appropriate for women as well as men.

9. To encourage high school females to seek additional information about women in science careers, and to provide help in obtaining such information.

The pilot program consisted of visits to 110 high schools across the United States; with a few exceptions each school was visited by both a woman scientist and an RTI field representative. The field representative was responsible for working out the schedule for the day's activities with the school, for preparing the woman scientist for the visit, and for assisting in the conduct of the visit.

A national sample of schools was offered the opportunity to participate in the program. Those that accepted the offer were randomly assigned to experimental and control groups. In addition to the visit, the experimental schools received a film to be shown before the visit; and both experimental and control schools received a resource packet of science career information. Students in both groups were given the opportunity to request additional information by returning a postage-paid postcard.

Typically, a circuit of 3 or 4 schools in a geographic area was visited by an RTI field representative and a woman scientist from the area within a 4 or 5 day period. Half of the circuits were randomly assigned to receive visits from women scientists chosen from the roster developed for this program; the remaining circuits were to receive visits from women scientists who were "handpicked" based on recommendations. A total of 40 women scientists were involved in the pilot program visits.

Each visit consisted of some combination of the following activities:

1. a large group meeting usually consisting of tenth grade female students (up to 150 students);

2. one or more seminars for female students who were particularly interested in exploring science career opportunities; these seminars were generally limited to 30 students each;

3. meetings with individual classes (which usually included both female and male students);

4. a meeting with school personnel including counselors, librarians, and a representative of the science, mathematics and social science departments;

5. a time when the woman scientist and field representative would be available to chat with interested students on an informal basis; and

6. an informal meeting with the principal and contact person.

Evaluation of the program was based on data provided by students, school contact persons, women scientists, and field representatives. In addition, RTI central staff members observed a number of the visits. Although there were a few problems in the pilot program, student reactions to the visits were quite favorable, and both women scientists and school contact persons responded overwhelmingly in favor of future participation in the program. In addition, comparisons between experimental and control groups showed that the program was effective in encouraging female students to seek additional information about science careers.

The selection of high schools to be visited is described in Chapter II, while Chapter III describes the procedures used in selecting the women scientists. Chapter IV presents information about the development of materials for use in the pilot program, and Chapter V discusses the data collection forms and procedures. The program's operations are described in Chapter VI, while Chapter VII presents the evaluation results. Finally, Chapter VIII provides recommendations for revising the program in the future.

II. SELECTION OF HIGH SCHOOLS TO BE VISITED

In order to estimate the percent of high schools in the nation which would be interested in participating in the Visiting Women Scientists Program, schools in a national probability sample were offered the opportunity of participating; those schools which expressed interest in the program were randomly assigned to experimental and control groups. Additional schools were obtained as needed to ensure that the Visiting Women Scientists Program would be tried out in a wide variety of school settings. The

procedures used in obtaining a set of schools to participate in the pilot program and the characteristics of the schools which were visited are described in the following sections.

A. Obtaining Permission to Contact the Schools in the Sample

The plans for the pilot Visiting Women Scientists Program included offering the opportunity to participate to each of the 324 high schools[2] which had been selected by RTI for the 1977 National Survey of Science, Mathematics, and Social Studies Education.

Due to the ever-increasing number of research studies involving public schools, state education officials have begun to take steps to control access to the schools in their state. The Council of Chief State School Officers has established the Committee on Evaluation and Information Systems (CEIS) which has as one of its major functions the screening of research studies which involve public schools. RTI drafted a letter describing plans for the Visiting Women Scientists Program and requesting CEIS approval of the program. This letter was revised by NSF, signed by Dr. Lewis A. Gist, Director, Division of Scientific Personnel Improvement, NSF, and sent to the chairperson of the CEIS Data Acquisition Committee.

Following CEIS approval of the plans for the program, a letter and accompanying descriptive materials, including a list of schools to be contacted, were sent to the Chief State School Officer (CSSO) in each of the 33 states which had schools in the sample; a copy of the letter is included in Appendix A. CSSOs were asked to contact RTI if they had any questions about the program. Several states contacted RTI to indicate endorsement of the program; one state called to make sure that the district superintendents would be informed of the program prior to contacting schools; and one state requested that the CSSO receive a copy of the materials sent to the schools.

B. School Interest in Participating in the Visiting Women Scientists Program

On October 14, 1977 a letter was sent to each of the 324 high schools in the sample, along with a brochure describing the Visiting Women Scientists Program, a form to use in indicating if the school wished to participate in the program, and a postage-paid envelope. Schools which indicated interest in the program were asked to complete a questionnaire about the feasibility

of various aspects of the program and to provide the name of the person to be contacted to schedule the visit. In each case the district superintendent was informed that a particular school (or schools) in the district was being contacted. A copy of the school questionnaire and the principal letter are included in Appendix B.

A total of 134 of the 324 schools which were invited to participate in the program indicated they would like to participate. Thirteen schools declined the offer: 3 because the principals believed they had too few females to make visits worthwhile; 2 because they were all-boys schools; and 8 for other reasons. The remaining 177 schools did not return questionnaires, and it was assumed they were not interested in participating in the program.

Based on the responses to the initial letter, it is estimated that approximately 39 percent of the high schools in the United States would wish to participate in the Visiting Women Scientists Program if given the opportunity using contact procedures similar to those used in the pilot program.[3]

As shown in Table 1, the percent of interested schools varied somewhat depending on region, type of community, and size of school. Because these results are based on very small samples, the sampling errors associated with subgroup estimates are quite large and only the very large differences between subgroups are statistically significant. Significant differences include:

(1) High schools in the North Central region of the country are more likely than those in the South or the West to be interested in participating in the Visiting Women Scientists Program.

(2) Schools in small cities and urban areas are less likely than those in the suburbs to be interested in participating in the program; in addition, urban schools are significantly less likely than rural schools to express this interest.

(3) Medium-sized schools are more likely to wish to participate than small schools.

Table 1

PERCENT OF SCHOOLS INTERESTED IN PARTICIPATING IN THE VISITING WOMEN SCIENTISTS PROGRAM BY REGION, TYPE OF COMMUNITY, AND SCHOOL ENROLLMENT

	Percent
Nation	39
Region	
Northeast	45
South	26
North Central	52
West	29
Type of Community	
Rural	43
Small City	29
Urban	15
Suburban	54
School Enrollment	
Less than 900	31
900-1600	54
More than 1600	36

C. Selecting Experimental and Control Schools

In order to begin the visits in January, it was necessary to set a cutoff date of December 1, 1977 for receipt of questionnaires from interested schools. One hundred and twenty-six of the 129 schools which had indicated interest by the cutoff date were grouped geographically into 30 clusters of from 2 to 6 schools in preparation for the selection of experimental and control groups; the remaining 3 schools were excluded because their distance from other interested schools would have made visits prohibitively expensive.

Schools within each cluster were randomly assigned to experimental and control groups using a procedure which would result in assigning approximately one-third of the schools to the control group.[4] The final count was 86 experimental schools and 40 control schools in 30 clusters. The experimental schools in each cluster constituted a circuit to be visited during a single week.

D. Obtaining Additional Schools to Participate in the Program

The initial plans for the pilot Visiting Women Scientists Program had assumed that at least 180 schools would be interested in participating, allowing the selection of 120 experimental schools and 60 control schools. Since the actual experimental group included only 86 schools, the decision was made to include additional schools to ensure an adequate trial of the program.

The selection of "extra" schools was accomplished in several ways. A number of schools and districts had heard about the program (often from The NSF Bulletin, from a professional society newsletter, or from a sample school) and had contacted RTI to ask if they might participate. Included in this group were approximately 10 public schools, a Catholic school, and several private high schools. Whenever possible, these schools were added to circuits in their areas which had fewer than 4 experimental schools. Several school districts had also asked if their schools might participate, and four additional circuits were established to include some of these schools.

Even after including many of the schools which had asked to participate, a number of circuits had fewer than the 4 schools which had been established as the target size for each circuit. In these cases, state department personnel and/or persons in districts in the particular geographic areas were contacted and asked to provide names of schools which might be interested; these schools were subsequently contacted and asked if they wished to participate. A total of 43 "extra" (i.e., non-experimental) schools were scheduled to receive visits.

E. Difficulties in Scheduling Visits

The circuit approach necessitated scheduling as many as 4 visits in a geographic area during a single week. As a result, it was not feasible to allow the schools to select the dates of their visits. The contact person in each experimental and "extra" school was sent a letter which indicated the date scheduled by the central RTI staff for the visit; a copy of this letter is included in Appendix E. Care was taken in scheduling the visits to avoid dates on which the principal indicated school would not be in session.

A total of 33 of the 129 schools (26 percent) which were scheduled to receive visits experienced some difficulty with the date. The most common scheduling problems were: (1) schools closed due to snow, (2) the visit date was immediately before or after vacation and the school felt the visit would be inconvenient and (3) the visit date conflicted with other activities such as competency testing, or teacher workdays. In some cases, the schools wished to reschedule the visit, and these requests were accommodated whenever possible. In other cases, the schools preferred not to reschedule. This occurred most often in cases where bad weather had caused the loss of several weeks of school.

One hundred and ten of the 129 scheduled visits actually took place; 96 of these occurred on the scheduled dates, and 14 were on rescheduled dates (in two cases, the visits were rescheduled twice). A total of 19 visits were cancelled either at the school's request or because rescheduling was not feasible.

F. Description of the Participating Schools

As mentioned above, a total of 110 schools participated in the pilot Visiting Women Scientists Program; this number included 75 experimental schools and 35 additional schools. As was intended, these 110 schools are a good cross section of the high schools across the United States; a number of the characteristics of the visited schools are described below.

Included in the 110 schools were 97 public schools, 10 Catholic schools, and 3 independent private schools. All 4 census regions of the United States were represented: 34 schools were in the North Central region (31 percent), 29 in the Northeast (26 percent), 28 in the South (26 percent), and 19 in the West (17 percent).

As shown in Table 2, the visited schools were distributed among a number of different types of communities. Twenty percent were in rural areas; 23 percent in small cities or towns (defined as places with fewer than 50,000 people that are not suburbs of larger places); 34 percent in one or another of the categories of urban areas, and 24 percent in suburban areas.

Table 2

DISTRIBUTION OF THE VISITED SCHOOLS
AMONG COMMUNITY TYPES

	Percent of Schools	N
Rural or farming community	20	22
Small city or town (less than 50,000)	23	25
Urban	34	37
Medium-sized city (50,000-100,000)	10	11
Large city (100,000-500,000)	16	18
Very large city (more than 500,000)	7	8
Suburban	24	26
Suburb of medium-sized city	6	7
Suburb of large city	12	13
Suburb of very large city	6	6
Total		110

The visited schools ranged in size from a low of 96 students in grades 10 through 12 to a high of 4200 students in grades 10-12. The distribution of schools according to school size is shown in Table 3.

Table 3

GRADE 10-12 ENROLLMENTS OF THE VISITED SCHOOLS

Enrollment in Grades 10-12	Percent of Schools	N
300 or less	12	13
301 - 500	12	13
501 - 1000	22	24
1001 - 1500	19	21
1501 - 2000	18	20
2001 - 2500	10	11
More than 2500	6	7
Unknown	1	1
Total		110

The schools which were visited also varied in their racial or ethnic composition. While most schools had rather small non-Caucasian enrollments (see Table 4), a number of schools had substantial minority enrollments. Eight visited schools had enrollments that were more than two-thirds black, and another 7 schools had enrollments that were more than one-third black. Seventeen schools had Hispanic enrollments (including Puerto Rican, Mexican or Chicano, and other Latin American origin students) constituting more than 10 percent of their total enrollments. Included in this figure are 1 school with 25 percent Puerto Rican enrollment, 1 school which was 80 percent Mexican or Chicano, and 1 which was 91 percent Mexican or Chicano.

Table 4

NON-CAUCASIAN ENROLLMENTS OF THE VISITED SCHOOLS

Percent of Non-Caucasian Enrollment	Percent of Schools	N
0	13	14
1-10	41	45
11-20	14	15
21-30	15	16
31-40	0	0
41-50	2	2
51-60	4	4
61-70	2	2
71-80	1	1
81-90	4	4
91-100	4	4
Unknown	3	3
Total		110

III. SELECTION OF WOMEN SCIENTISTS

A. Development of the Roster of Women Scientists

A roster of women scientists interested in participating in the Visiting Women Scientists Program was developed by mailing application forms and information to a variety of women scientists whose names were obtained in several ways:

(1) samples from available rosters of women in professional science organizations such as the American Astronomical Society and the American Statistical Association;

(2) recommendations by people in various disciplines and organizations such as the American Chemical Society's Women Chemists Committee;

(3) responses either by phone or letter to announcements of the program placed in various newsletters, such as The NSF Bulletin and The Association for Women in Science Newsletter;

(4) portrayals of women scientists in various articles, pamphlets, etc., such as "Space for Women" and "I'm Madly in Love With Electricity;"

(5) registration lists of the national conventions of the Society of Women Engineers and the Engineering Foundation and

(6) miscellaneous requests for information and application forms from women scientists who did not mention their source of introduction to the program.

The roster consisted of those women scientists who returned completed application forms to RTI.

Approximately 1,200 application forms were mailed to women scientists during September and October 1977. To ensure that the group of visitors would include women with a variety of educational and occupational experiences as well as differing personal characteristics, the application form requested information about area of science, degrees obtained, employment status, job activities, marital status, and race or ethnic background. In addition, respondents were asked to indicate the types of information they believed should be conveyed to high school students during the Visiting Women Scientists Program. A copy of the application form is included in Appendix C.

While RTI had sent announcements of the program to newsletters in August requesting that they be published as soon as possible, a number of newsletters published the announcements as late as November and December. In addition, other newsletters picked up the announcement and published it as late as February, 1978. As a result, letters of inquiry were received from more than 300 women scientists after the roster had been developed. A letter was sent to each of these people explaining that the response to the original announcements had been overwhelming and that applications for the pilot program were no longer being distributed.

As Table 5 shows, the different methods of obtaining names yielded varying degrees of success in terms of the percent of completed applications returned to RTI. The most productive avenue of obtaining interested women was the newsletter announcement approach: 354 women requested applications after they read about the program in a newsletter, and 247 (70 percent) of these submitted applications. Another 170 women requested application forms without specifying where they had heard of the program. Presumably, most of these had seen an announcement of the program, although a few may have heard about the program from a colleague; the return rate for women scientists in this "other" category was 71 percent as 120 of the 170 women submitted applications. As might be expected, mailing unsolicited applications to women scientists randomly selected from rosters of professional organizations yielded the smallest return rate (24 percent).

Table 5

METHODS USED IN DEVELOPING THE ROSTER FOR THE VISITING WOMEN SCIENTISTS PROGRAM

	Applications Sent	Applications Returned	
		Number	Percent
Rosters of Professional Organizations	282	67	24
Recommendations	308	142	46
Newsletter Announcements	354	247	70
Profiles of Women in Articles, Pamphlets, etc.	92	39	42
Other	170	120	71
Total	1206	617	51

It was hoped that the search for women scientists would result in a roster which contained a good balance of women from a variety of racial and ethnic backgrounds, areas of science, types of employment, and life styles. The composition of the roster is shown in Tables 6-11. Note that the roster does not always provide the desired balance. For example, the roster includes relatively few minority women scientists and an overabun-

dance of physical scientists and those employed in academic positions. It may be necessary to supplement this roster if it is to be used as a source of women scientists in future programs.

Table 6

ROSTER OF WOMEN SCIENTISTS--
AREA OF SCIENCE

	Number	Percent
Biological Science	150	24
Physical Science	256	42
Engineering	71	12
Mathematics	56	9
Social Science	82	13
Unknown	2	
Total	617	

Table 7

ROSTER OF WOMEN SCIENTISTS--
HIGHEST DEGREE OBTAINED

	Number	Percent
Bachelor's Degree	99	16
Master's Degree	131	21
Doctorate	382	62
Other	5	1
Total	617	

Table 8

ROSTER OF WOMEN SCIENTISTS--
RACE OR ETHNIC BACKGROUND

	Number	Percent
American Indian	4	1
Black, Afro-American or Negro	37	6
Mexican American or Chicana	3	1
Puerto Rican	2	0
Other Latin American Origin	3	1
Oriental or Asian American	21	3
White or Caucasian	527	85
Other	13	2
Unknown	7	1
Total	617	

Table 9

ROSTER OF WOMEN SCIENTISTS--
TYPE OF EMPLOYMENT

	Number	Percent
Academic	384	62
Non-Profit Organization	38	6
Profit-Making Organization	120	19
Government	60	10
Unknown	15	2
Total	617	

Table 10

ROSTER OF WOMEN SCIENTISTS--
MARITAL STATUS

	Number	Percent
Presently Married	385	62
Not Presently Married	230	37
Unknown	2	0
Total	617	

Table 11

ROSTER OF WOMEN SCIENTISTS--
CHILDREN LIVING AT HOME

	Number	Percent
Yes	277	45
No	338	55
Unknown	2	0
Total	617	

B. Selection of Women Scientists

The design of the pilot Visiting Women Scientists Program included a comparison of two methods of selecting women scientists. The first method was to use the roster to select women scientists who had indicated interest in and availability for participation in the program. Information about the qualifications of women in the roster was generally limited to that which they had provided on their application forms. In contrast, the second method was to "handpick" women scientists who were suggested as particularly skilled in public speaking and able to relate to high school students. In order to test the relative effectiveness of these two methods of selecting women scientists, the 30 clusters of schools to be visited were randomly assigned to "roster" and "handpicked" groups. Each group of women scientists was to include a balance of educational, occupational, and personal characteristics.

For cost reasons, geographic location was a prime consideration in selecting women scientists to conduct the visits in each circuit. In selecting women scientists, priority was given to those who had indicated they would be able to visit 3 to 5 schools on consecutive days.[5] Responses to the question about information to be conveyed to students were used to screen out those women scientists who appeared bitter about the treatment of women or who appeared to advocate a single lifestyle as the answer for all women.

The Advisory Panel had recommended that approximately 60 percent of the visitors should be women scientists employed in industry, no more than 15 percent should be biologists and no more than 15 percent should be

social scientists. (These figures were established to reflect projected employment opportunities.) However, the composition of the roster along with geographic and scheduling constraints made it difficult to meet these criteria. In addition, for schools with large minority enrollments, an attempt was made to select a visitor of the same race or ethnic background to facilitate rapport with the students. Because of the composition of the roster, matching was usually accomplished by selecting a minority woman employed in a university.

Once the 15 circuits to be visited by "handpicked" women scientists had been identified, Advisory Panel members were asked to recommend the names of scientists from each of the 15 geographic locations who were particularly well suited for participation in the program. Recommendations were also solicited from major science-related industries and universities in those geographic areas. Finally, the Office of Opportunities in Science of the American Association for the Advancement of Science provided the names of women scientists in those areas.

As the selection of women scientists proceeded, it became obvious that a statistical comparison of the effectiveness of the two methods would not be meaningful. First, approximately one-fourth of the women scientists in the roster had originally been recommended by people in various disciplines and organizations; therefore, a number of the visitors selected from the roster could be considered "handpicked." In addition, given the composition of the roster and geographic and scheduling constraints, the group of women scientists selected from the roster did not represent the desired balance in terms of areas of science or type of employment. The decision was made to select the "handpicked" group to create a better balance in the entire pool of visitors. Comparisons of the two methods would be limited to their operational feasibility rather than their effectiveness in a statistical sense.

C. Characteristics of the Visiting Women Scientists

Forty women scientists participated in the 1978 pilot program. As discussed in the previous section, an attempt was made to limit the number of social scientists and biologists and to select more women from industry than from academia. The composition of the group of 40 visitors by area of science, type of employment, and race or ethnic background can be seen in Tables 12-14.

Table 12

VISITING WOMEN SCIENTISTS--
AREA OF SCIENCE

	Number of Visitors	Percent
Biological Science	6	15
Physical Science	12	30
Engineering	13	33
Mathematics	5	13
Social Science	4	10
Total	40	

Table 13

VISITING WOMEN SCIENTISTS--
TYPE OF EMPLOYMENT

	Number of Visitors	Percent
Academic	14	35
Non-Profit Organization	2	5
Profit-Making Organization	16	40
Government	8	20
Total	40	

Table 14

VISITING WOMEN SCIENTISTS--
RACE OR ETHNIC BACKGROUND

	Number of Visitors	Percent
Black, Afro-American or Negro	5	13
White or Caucasian	33	83
Mexican American or Chicana	2	5
Total	40	

As can be seen in Table 15, nearly half of the women visitors had obtained their doctorate. As would be expected, women in engineering were more likely to have only a bachelor's or master's degree compared to those in such fields as biology or the social sciences.

Table 15

VISITING WOMEN SCIENTISTS--
HIGHEST DEGREE BY AREA OF SCIENCE

	Highest Degree Obtained by Visitor			
Area of Science	Bachelor's	Master's	Doctorate	Total
Biological Science	1	2	3	6
Physical Science	3	4	5	12
Engineering	6	4	3	13
Mathematics	0	2	3	5
Social Science	0	0	4	4
Total	10 (25%)	12 (30%)	18 (45%)	40

The woman scientist application form asked for the dates in which degrees had been obtained. Table 16 shows the distribution of the visitors according to the year in which they received their earliest degree. Based on the assumption that the year of award of a bachelor's degree is a reasonable measure of age, a good balance across a span of ages was represented.

Table 16

VISITING WOMEN SCIENTISTS--
YEAR OF EARLIEST DEGREE

Year of Earliest Degree	Number of Visitors	Percent
1936-55	6	15
1956-60	5	13
1961-65	8	20
1966-70	7	18
1971-73	6	15
1974-76	8	20
Total	40	

D. Problems Encountered in Scheduling Women Scientists for Visits

Problems in scheduling women scientists for visits usually involved finding women scientists who could make a commitment to visit an entire circuit of schools, often as many as 4 schools in one week. Although most of the applicants had indicated a willingness to visit schools on consecutive days, a number of the women scientists who were contacted about participating in the pilot program could do so only during a specific period of time, such as spring break. As a result, 8 circuits had to be "split," i.e., two women scientists each visited different schools within the circuit.

There were fewer scheduling problems associated with women scientists selected from the roster than with the "handpicked" women scientists. Those who applied for the program appeared to have a greater understanding of the commitment involved than did those women recommended for the "handpicked" group. This difference may have been due, at least in part, to the ways in which the scientists were contacted. In the case of the roster, the women scientists received materials describing the program and had the opportunity to think it over before deciding whether or not to apply. Because of difficulties encountered in obtaining the names of recommended women scientists in certain geographical areas, time constraints often made it necessary to contact "handpicked" scientists by telephone to explain the program to them and to solicit their participation. Since most of them had not heard of the program prior to being called, they may not have been fully aware of the commitment expected of them. A few of these agreed to conduct one or more visits, but found out later that they could not fulfill this commitment.

Five schools were visited solely by a field representative. In two cases this was due to a cancellation by the woman scientist at the last minute. In another instance the visit had to be cancelled because the field representative's car broke down and the woman scientist was unavailable for the rescheduled date. The other 2 cases involved "extra" schools that were scheduled too late to provide sufficient time for obtaining a woman scientist to accompany the field representative.

IV. LOCATION AND DEVELOPMENT OF MATERIALS FOR USE IN THE PILOT VISITING WOMEN SCIENTISTS PROGRAM

A. Collection of Existing Materials

During the planning phase of the pilot program, an extensive search was made for materials which might be useful in the Visiting Women Scientists Program. The Educational Products Information Exchange (EPIE) had conducted a study of commercial and non-commercial career education materials in 1975 and produced a report indicating the topics covered, the target population(s), and the types of evaluation data available for each material.[6] The EPIE report, publishers' catalogues, and various bibliographies were used to identify materials of possible relevance to the Visiting Women Scientists Program, and RTI contacted the publishers of these materials to request review or complimentary copies.

According to Career Education in the Public Schools 1974-75: A National Survey,[7] the American Institutes for Research (AIR) has also collected career education materials, and has evaluated them along a number of dimensions including sex-role stereotyping, but repeated attempts to obtain these evaluation data were unsuccessful.

Professional organizations such as the American Chemical Society and the Society of Women Engineers, and a variety of industrial firms such as General Electric and IBM were also contacted to obtain existing materials relating to science careers for women. Finally, Advisory Panel members and NSF personnel provided copies of materials and information about other materials. Many of the early contacts produced leads for additional contacts, and these were subsequently carried out. As a result, RTI obtained a rather comprehensive set of the available pamphlets, books, films, filmstrips, and bibliographies of additional materials.

The materials which were collected were examined to determine their appropriateness for meeting the objectives that had been established for the Visiting Women Scientists Program. Several of the materials proved to be suitable for use in the program, either for use by the field representative, for distribution to students, or for inclusion in a resource packet to be given to the schools. Other materials were listed in an annotated bibliography which was also given to the schools.

1. Women in Science and Technology: Careers for Today and Tomorrow

This 16-page illustrated booklet, published by the American College Testing Program in 1976, is an excellent booklet which explores some of the myths and realities about women in science, the careers available, characteristics of successful women in science careers, and the steps necessary to plan a successful career. It utilizes comments and pictures from a variety of women scientists in order to convey its message that women should consider careers in science and technology. It was decided to include the Women in Science and Technology booklet in the resource packet and also to mail a copy to each student who requested additional information about women in science careers. In addition, permission was obtained to use an excerpt from the booklet ("What Steps Can You Take to Plan a Successful Career?") as a handout to be distributed to students.

2. The Women's Prejudice Film

The Advisory Panel recommended the use of a film as a motivational device. After careful examination of several possible films, it was decided to have The Women's Prejudice Film sent to each school approximately one week prior to the visit. While not specific to science, this film explores many of the issues relating to the employment of women. Contact persons were requested to have The Women's Prejudice Film shown to as many as possible of the students who would subsequently participate in the program.

3. Materials Included in the Resource Packet

RTI put together a resource packet to be left with visited schools and to be sent to control schools. The resource packet included a variety of materials about career opportunities in the biological sciences, physical sciences, engineering, mathematics, and social sciences. Materials encouraging women to consider careers in engineering were particularly abundant (as professional engineering organizations have been attempting to correct the marked underrepresentation of women in these fields) and a number of these were included in the resource packet. Less emphasis was placed on some of the science fields (especially those in the social sciences) where underrepresentation of women is not a serious problem. Information about financial aid was particularly scarce, but the resource packet does include a few materials which describe scholarship and fellowship opportunities.

The resource packet which was a part of the 1978 Visiting Women Scientists Program is outlined in Appendix E, along with an annotated bibliography of especially good materials and films.

B. Development of Additional Materials

A number of materials were developed specifically for the Visiting Women Scientists Program. These are described below.

1. Visiting Women Scientists Program Brochure (Yellow)

This brochure, included in Appendix C, gives a brief overview of the purposes of the Visiting Women Scientists Program and the scope of the pilot program. The brochure was used for a number of general informational purposes: It was included with the letters to Chief State School Officers and with the application forms mailed to sample schools and women scientists. The brochure was also sent to persons who contacted RTI to ask for information about the program.

2. Careers In Science and Technology: More Women Needed

This brochure, included in Appendix E, has a cover resembling a "help wanted" section of a newspaper's classified advertisements; information about current and projected employment opportunities in science and technology careers is provided inside the brochure. The contact person in each school received a supply of these brochures with instructions to distribute them to students after they had seen The Women's Prejudice Film.

3. Visiting Women Scientists Program Modules

Each field representative and woman scientist was given a set of modules for use in the visits as appropriate. Ten modules were developed; some provided background information, for example, about employment projections, while others were designed for active student involvement. A copy of the set of modules is included in Appendix F.

The modules were designed to provide information about program objectives and to launch a worthwhile discussion between the visitors and the students. The modules dealt with various topics including the following:

a) definitions of various types of science;
b) male/female differences in attitudes toward careers for women;
c) conflict between a career and personal life;
d) barriers to participation of women in science careers;

e) importance of science and mathematics prerequisites;
f) steps to plan a successful career; and
g) skills and interests for science careers.

Several of the modules made use of materials which had been developed by others, most notably the "role conflict" and "skills and interests for science careers" developed at The University of Kansas[8] and the "Steps to Plan a Successful Career" developed by the American College Testing Program. Many of the descriptions of the lives of women scientists used in the "Profiles of Women Scientists" module were adapted from other materials[9]; others were provided by women scientists in the roster. (A number of these women scientists also provided slides.) Information provided in the Department of Labor's Occupational Outlock Handbook[10] was also utilized.

V. THE ROLES OF THE FIELD REPRESENTATIVES AND SCHOOL CONTACT PERSONS

During the planning of the Visiting Women Scientists Program, RTI established the roles of the trained field representative and the contact person to ensure that details of the visit would be arranged and that logistical problems would be held to a minimum. The roles of the field representatives and school contact persons are described in the following sections.

A. Hiring and Training the Field Representatives

Four field representatives were employed on a full-time basis for the four-month period from January through April, 1978. In the planning phase of the program, it was determined that the field representatives would be drawn from among the following pools: (1) science graduate students, preferably those who have had work experience in a science field; (2) recently graduated master's or doctoral students with work experience in a science field who have not yet found permanent employment; and (3) currently unemployed scientists who would like short-term employment.

The field representatives were generally recruited by running an advertisement in the major newspaper of a particular metropolitan area. Persons who expressed interest in the position were requested to provide copies of their resumé, including references; and selected candidates were interviewed in person by central RTI staff. In making final decisions about candidates central staff strongly considered the following factors: (1) the necessity of being able to relate to women scientists and school personnel in the role of a facilitator and coordinator; (2) the capability of relating to school officials and students in a variety of roles, including public speaking, small group seminars and media presentations; and (3) a flexible time and travel schedule. The 4 women who were hired as field representatives had various levels of science training and education and were willing to accept short-term employment during the specified period of time.

The training session at RTI was scheduled for January 17-21. The field representatives were asked to complete several preliminary activities in high schools during the two weeks prior to the training session (see Appendix D). The activities were designed for two specific purposes: to acquaint the field representatives with the program, and to field test the procedures and materials which had been developed. In addition to the practical experiences of the preliminary field trials, the field representatives visited local high schools and conducted additional program activities during the training session. Based upon these experiences, field representatives and RTI central staff worked together to incorporate suggestions about procedures and to revise program materials. Field representatives then received revised procedures and materials for use in the school visits for the Visiting Women Scientists Program.

B. The Role of the Field Representative

When the pilot Visiting Women Scientists Program was being designed, the field representative position was viewed as an essential ingredient for successfully conducting visits across the nation. It was anticipated that the field representatives would act as local liaisons, arranging the details of the school visits with the school contact persons and ensuring that each woman scientist would be sufficiently prepared for her visits, including travel arrangements. They were to reduce the burden on participating

schools and women scientists and help avoid logistical problems. The pilot program demonstrated that this role was in fact critical to the success of the program.

On the average, each of the four regional field representatives worked with 10 women scientists in visiting 25-30 different schools. As discussed previously, each woman scientist generally visited from 2 to 4 schools on consecutive days in a "circuit," which is defined as a cluster of schools in geographical proximity. Forty women scientists conducted visits in 105 schools as follows: 7 women scientists visited a single school; 13 visited 2 schools each; 10 visited 3 schools; 8 visited 4 schools; and 2 women scientists visited 5 schools each.[11] An additional 5 schools were visited by field representatives alone, as operational problems made it impossible for women scientists to conduct these visits.

After RTI central staff established a tentative date for the school visit, a letter was sent to the school contact person who was designated by the principal to arrange the details of the visit in the school (see Appendix E). This letter discussed the general parameters of the program and gave the name of the field representative who would call the contact person to develop a detailed schedule of activities. The field representatives maintained telephone contact with each school contact person, often making as many as 5 separate telephone calls to arrange a final detailed schedule of activities and to be sure that facilities and equipment would be ready for the daylong visit.[12]

RTI central staff were responsible for making the initial contacts with women scientists and for sending them materials which described the program and the general role of the woman scientist in the visits (see Appendix F). The materials sent to the women scientists provided them with the following: a schedule of visit dates for their schools; the objectives of the program; a description of the various types of activities which might be conducted in the schools; background materials concerning the issues related to the program; an explanation of the types of presentations the women scientists should prepare; and information relating to reimbursement for time and expenses.

It was up to the field representative to inform the woman scientist of the detailed schedule of activities in each of her schools and to discuss her specific roles and presentations in the schools. In preparing the

woman scientist for the visits, the field representative often called her 2 or 3 times by telephone and then met with her for an hour or two prior to the first visit. Typically, the visit to the first school in each circuit was conducted along the lines laid out by the field representative; however, once the visits began, the field representative and the woman scientist worked together in planning and revising their presentations for the remaining visits.[13]

During the school visit, the field representative assisted in conducting many of the activities and worked with the school contact person to resolve any problems that occurred in connection with the visit. Field representatives also handed out various materials to students and collected evaluation forms from them. After visits were made to all schools in the circuit, they wrote personal thank-you letters to the schools and completed reports for RTI concerning the activities conducted in each school and any problems associated with the visits (see Appendix I).

C. The Role of the School Contact Person

Each of the school principals designated a staff member to be the contact person for the Visiting Women Scientists Program. The contact person was to work with the field representative in arranging and conducting the visit. As Table 17 illustrates, the 110 principals designated a variety of persons (including themselves in some cases) to be contact persons. Members of the school's science teaching staff (either teachers or department heads) and counselors were the persons most likely to be asked to fill this role.

Table 17
SCHOOL CONTACT PERSONS WHO HELD
PARTICULAR STAFF POSITIONS

Staff Position	Number	Percent
Principal	14	13
Assistant Principal	9	8
Counselor	34	31
Science Department Head	31	28
Science Teacher	18	16
Other	4	4
Total	110	

On the School Contact Person Record of Visit (Appendix H) these people were asked how much time they spent arranging for the visit (scheduling, talking to teachers, corresponding with the visitors, etc.). The responses, shown in Table 18, indicate that most contact persons spent from 2 to 5 hours in arranging for the visit, but a few spent considerably more time than that (5 contact persons reported spending more than 10 hours).

Table 18

SCHOOL CONTACT PERSONS SPENDING VARIOUS RANGES OF TIME TO ARRANGE VISITS

Time Spent	Number	Percent
Less than 2 hours	26	24
2-5 hours	59	54
6-10 hours	19	17
More than 10 hours	5	5
No Response	1	1
Total	110	

In addition to spending time arranging the visits most school contact persons also spent a considerable amount of time working with the field representative and the woman scientist during the day of the visit, conducting such activities as helping arrange for students to attend sessions, attending the counselor meeting, obtaining necessary equipment and facilities, and accompanying the visitors through unfamiliar surroundings.

D. Evaluation of the Field Plan: Use of the Field Representative and School Contact Person

There is a considerable amount of data indicating that the logistical plan of using field representatives and school contact persons worked very well. Women scientists were asked to rate the performance of the field representative who accompanied them to their schools (Woman Scientist Record of Visit in Appendix I). They were to rate the field representative in terms of being pleasant and courteous and in terms of doing everything possible to insure a successful visit. Thirty-five of the women scientists rated the field representative "excellent," and the other 5 rated her "good"; no women scientists used the categories "fair" or "poor."

Although these ratings were made with reference to the performance of specific field representatives, they also reflect upon the role being fulfilled by these persons. In fact, when asked to comment upon the performance of the field representative, many women scientists made comments relating to the various aspects of the role of the field representative. Some commented about the logistical support which allowed them to concentrate on their presentations and avoid problems. Others appreciated the briefing they received about the program in general and about the specific characteristics of each school, based upon communication between the field representative and the school contact person. Some also remarked favorably about the way field representatives related with school personnel and about the diversity that was added by having a second woman scientist present to help with the presentations. The following comment made by one woman scientist was particularly relevant to the planned role of the field representative:

> I have done quite a bit of volunteer work of this nature in the past, and have often had trouble being met (the office did not know I was coming, etc.) and also arranging in advance just what was expected of me (what materials to bring). It was most pleasant having someone to smooth the way for me, and to get treated like a V.I.P. at the schools. The school couldn't have been nicer or more helpful ....

The school contact person was asked to rate the field representative in terms of the same dimensions. (School Contact Person Record of Visit in Appendix H). Contact persons in 86 of the 110 schools (78 percent) rated the specific field representative "excellent," while 21 (19 percent) rated her "good"; none rated her "fair," 2 rated her "poor," and 1 did not respond to the question.

Similarly, with a very few exceptions, the school contact persons did a very good job of arranging for the visits. The field representatives and the RTI site visitors reported that in most cases the schools were very well prepared for the visits. For example, there were few instances when teachers did not know their classes were to be visited or when needed equipment and facilities were unavailable.

VI. DESCRIPTION OF PROGRAM OPERATIONS

Between January and May of 1978, 40 women scientists visited more than 100 high schools across the United States. The women scientists, accompanied by one of four specially trained RTI field representatives, brought the Visiting Women Scientists Program to about 15,500 high school students in grades 10-12, including approximately 13,500 females and 2,000 males. The major purposes of this chapter are (1) to describe the types of activities which comprised the daylong visit in each school and (2) to discuss how the field representative, with support from the RTI central staff, prepared the school contact persons and the women scientists for the visits.

A. Types of Activities

After the visit date was scheduled by the RTI central staff, the field representatives worked with the designated school contact persons by telephone in arranging the specific activities to be conducted during the daylong visit, choosing from a list of activities which had been described in RTI correspondence with the contact person (see Appendix E).

Approximately one week before the date of the visit, the school contact person received a film entitled The Women's Prejudice Film. The school was asked to show this film to all students who would be involved in the Visiting Women Scientists Program. The film and an accompanying brochure (see Appendix E), which was to be handed out after the film was shown, were primarily awareness materials for tenth graders and other female students who had not previously given much thought to the possibility of entering non-traditional careers, including those in science and engineering. The film was developed to stimulate the viewer to reappraise his or her current attitude concerning the equality of roles among men and women; it points out that women themselves need to explore the world of work more fully. The film was shown to over 20,500 students in 83 schools. As of the day of the visit the remaining 27 schools (25 percent) had not used the film.

The various types of activities which were generally included in the visit schedule established by the field representative and the school contact person are discussed below.

1. Large Group Meetings for Female Students

Schools were asked to arrange a large group meeting of tenth grade female students, and about half of the schools arranged such a meeting. Large schools sometimes selected a portion of the tenth grade females for the meeting, or they arranged two or more separate meetings for these students. Some schools also included students from grades 11 and 12 in large group meetings.

Tenth grade females were a major target of the program because they could be made aware of the potential for women in science and engineering careers at a time when they could still redirect their high school program to include more mathematics and science. The general approach towards the tenth grade females in the large group meetings was to provide them an opportunity to meet a woman scientist role model and to raise their consciousness level.

The field representative usually spoke first at the large group meeting. She would typically introduce herself and the woman scientist, then present a brief overview of the program's purposes. After this, the field representative would discuss some of the issues associated with women in science, often weaving in some facts about herself or other women in the work force.

The field representative usually finished her presentation in about 15 minutes and then introduced the visiting woman scientist, who used another 15-20 minutes for her presentation. There was a great deal of variation in these presentations, depending upon the activities and personalities of the particular woman scientist. Many of the women scientists prepared demonstrations related to their jobs. One woman scientist brought an actual cross section of a cylinder head from an aircraft engine in order to relate her research on fuel injectors to the students. An engineer assembled a miniature water treatment system from test tubes and demonstrated how the system removed hardness (calcium and magnesium) from water using sodium zeolite resins. A third woman scientist, a geophysicist in the petroleum industry, brought along several specimens to explain the tools of a geophysicist and show what oil and gas really look like in their natural states.

Other women scientists brought slides or pictures. Some of the students saw slides or pictures related to jobs, including state population and migration patterns, cultural anthropologists at work, and physiological

slides of different animals. Other students saw slides of women scientists at home with their families and friends, or enjoying their leisure moments in recreational activities.

In addition, the women scientists talked to the students about their education, training and personal backgrounds. Many related how they happened to choose a scientific career; some had aspired to such careers from an early age while others seemingly stumbled into them or made later career decisions. Some talked about the problems associated with combining a career in science and technology with a full family life and the ways in which they resolved these problems.

After the woman scientist had completed her presentation, the field representative usually took the lead again to conduct a question and answer session (as time and the large group atmosphere allowed), tell the students about the career materials being left at the school, and hand out the postcards which the students could use to obtain more information about women in science careers.

2. Seminars with Approximately 20 Females

Schools were encouraged to schedule one or more seminars for approximately 20 females from grades eleven and twelve. Since juniors and seniors could not so easily redirect their high school programs to include more math and science, schools were encouraged to invite or select female students who were particularly interested in a science career, or who were taking electives in math and science. The major purposes of these seminars were (a) to reinforce the notions that women can be interested and successful in science careers and that they can combine these careers with full private lives, and (b) to provide specific information in response to the students' questions.

Most schools arranged at least one all-female seminar, and many arranged two or three of them. These seminars varied a great deal in size, depending upon interest and facilities, and some schools involved sophomores as well as juniors and seniors. Many schools limited participation to females taking elective math and science courses; some schools selected the students for the seminars, and others allowed the students to decide whether or not they wanted to attend.

The field representative usually spoke first, as at the large group meetings. After introducing herself and the woman scientist and presenting a brief overview of the program's purposes, the field representative would generally stress a few major points that she thought would be relevant to the particular audience. (Sometimes the school contact person had been asked to brief the visitors about the general awareness and course background levels of the students; and oftentimes the field representative would ask the group about their career aspirations and course backgrounds.)

The field representative usually talked for 10-15 minutes and then introduced the woman scientist. The points of emphasis varied, but there were certain overriding themes which were generally covered in each seminar: more women are entering the traditionally male fields of science and engineering; because of new attitudes and federal laws there are many opportunities for women in the sciences; one does not have to be a genius to succeed in a career in science or engineering, but high school females should definitely take electives in science and math in order to have the option of entering these careers later.

If the woman scientist had prepared a demonstration or some type of slide presentation, she would often open her presentation with it, as in the large group meetings. In these all-female seminar settings the women scientists were likely to add a discussion of the problems associated with combining a successful career and a full home life, using examples from their own situation or that of a colleague. The woman scientist and the field representative were also able to entertain specific questions from the students, with both responding to the questions.

The woman scientist usually took 20-25 minutes in making her presentation and responding to questions, and then the field representative would again take the lead. If time permitted, there would be a question and answer session before the field representative told the students about the career materials being left in the school and handed out the postcards which the students could use to obtain more information about women in science careers.

Although most of the seminars were conducted in a similar fashion, the visitors had several alternatives open to them. As described in Chapter IV, program planners designed several modules which presented activities that could be used to accomplish various objectives of the program. The

field representatives had been trained in the use of these modules, and they had the necessary supplies for using them; the women scientists had also read the modules and in many cases had been briefed in their use by the field representatives. The modules could be used to add variety to the presentation or enliven a lagging session.

3. Meetings with Science, Mathematics and Social Science Classes

Schools could arrange to have the visitors meet with classes which included both males and females. However, as the program progressed it became clear that many of the objectives of the program were best implemented when the activities were conducted with all-female groups. Because of their overall greater interest in science, male students often dominated discussions about science careers and this may have reinforced the notion that science is a male's domain. In addition, the female students almost never raised questions concerning the problems associated with combining personal lives and successful careers when males were present. Therefore, field representatives increasingly encouraged schools to arrange all-female seminars rather than classroom visits.

When visits were scheduled with intact classes, the field representatives and women scientists conducted their activities much as in the seminars. Because of the presence of males (in many cases more males than females were present), the presentations and discussions tended more toward factual aspects of science and engineering careers than toward the specific opportunities and problems of young women aspiring to those careers.

4. Informal Conversations with Interested Female Students

A number of schools arranged to have a period of time set aside for highly motivated female science students to meet with the visitors. Some schools would arrange for 5-10 students to meet together with the field representative and woman scientist; others arranged for individuals to have a short period of time with the visitors. In most cases the students had already attended a session earlier in the day and had a good idea of the purposes of the program and the assistance they could expect from the visitors. Therefore, the students and visitors were able to move quickly to specific individual concerns. The students had various questions and concerns in the following areas: high school and college courses needed to pursue certain careers in science and technology; job opportunities for

women in certain careers; problems women have in career advancement; and problems women encounter in combining a career with a fulfilling private life. The field representatives and women scientists responded to the concerns from their own backgrounds and experiences, and they also guided the students to other relevant sources of information.

5. A Meeting with Counselors, Teachers and Other School Personnel

The school contact person was asked to schedule a meeting with interested staff, including some of the following: guidance counselors; teachers in the areas of science, math and social science; school librarians; and other interested school or district personnel. There were three purposes for this meeting: to explain the goals and rationale of the Visiting Women Scientists Program to these staff members and tell them what the visitors were doing in their school; to describe the resource packet of materials which was given to the school; and to discuss the overall topic of women in science, eliciting any ideas the staff might have as to how NSF could assist schools in encouraging more high school females to continue in science and engineering.

It was often very difficult for the contact person to arrange a staff meeting because of the operational problems associated with school schedules. A meeting took place in 87 (79 percent) of the 110 schools; however, many staff positions were not represented in a number of meetings, as shown in Table 19. In addition, because of scheduling difficulties, the meeting often had to be held during lunch or immediately after school for an abbreviated period of time.

Table 19

SCHOOL STAFF POSITIONS NOT REPRESENTED IN THE 87 COUNSELOR MEETINGS

Staff Position	Number Times Not Present	Percent
Counselor	7	8
Science Teacher	16	18
Math Teacher	35	40
Social Science Teacher	45	52
Principal	71	82
Librarian	40	46

To initiate the meeting, the field representative introduced herself and the woman scientist and presented a brief overview of program purposes. She then described the activities of the program and the specific activities which were taking place in the school. The field representative would then describe the contents of the resource packet and show its contents to the participants. In most cases the resource packet had been sent to the school contact person prior to the visit. Its contents included the following:

a) pamphlets describing career planning in general;

b) pamphlets specific to careers in science, engineering and technology;

c) information about financial aid; and

d) an annotated bibliography of especially good career publications and films along with information on how and where to obtain them.

The participants were told where the resource packet would be located, and they were informed that students who attended sessions had been encouraged to use the resource packet. (The guide to the resource packet is in Appendix E.) The most popular location for the resource packet was the guidance office, where 53 of the 110 schools (48 percent) placed it. Nineteen schools placed the resource packet in the career center; another 18 schools located the resource packet in the library, while 16 placed it in the science department. Several schools requested extra copies of the resource packet for placement in additional locations, and these requests were fulfilled.

The field representative then opened the meeting for discussion, stating that she hoped to get reactions to the Visiting Women Scientists Program and to obtain ideas about other ways NSF might help encourage the participation of women in science. Most participants were positive about the program's goals and supportive of its activities, and many expressed the hope that it would be continued in the future.

In about half of the counselor meetings, participants presented ideas about additional ways NSF might assist in this area. There was a wide variety of ideas, but certain ones were brought up in several meetings. Many school people would like to be supplied with updated information about science careers and related topics, including job forecasts, materials

relating jobs to colleges and specific courses, and sources of financial aid. A number of school people requested that the information be presented using visual aids or media, such as posters, cassette tapes, radio, or television.

A second idea which was raised in many schools was the development of a roster of local women scientists who would be available to visit schools. Some school personnel added that NSF should also pay the visiting women scientists. Another idea which was raised in many meetings was to extend the program to younger students. Many participants expressed the opinion that the ninth grade is more appropriate for making decisions about taking additional courses in math and science; others stated that some sort of program should be developed for the lower grades; and still others felt that males also need to be made aware of information about science careers.

A number of school personnel expressed a desire for NSF to award grants for career education programs in science. Some specific areas for funding were as follows: intern programs; summer institutes for women; career days; field trips related to science careers; science programs for elementary teachers; and shadowing, where students spend a day or two with a person at work.

B. Activities Selected by Schools

It is very difficult to describe a typical visit, since the school contact person and the field representative had a great deal of latitude in establishing the detailed schedule of activities, and the visits varied tremendously from school to school. However, data are available which indicate the frequency of each type of meeting and the various combinations of meeting types within a single visit. Table 20 on the following page presents data concerning the types of meetings attended by students. Across all 110 schools more than 15,000 students were seen in the 3 formal activities: 6,739 in large groups (4,195 of whom were tenth grade females); 4,713 in seminars; and 4,251 in classes.

At least 1 large group presentation was conducted in 55 schools. In all, there were 78 large groups meetings with an average attendance of 86 students per meeting. In the 85 schools which scheduled seminars, there were a total of 213 seminars with an average of 22 students in each. Finally, there were 155 presentations to class groups in 61 schools, with an average of 27 students per session.

Table 20

PARTICIPATION IN LARGE GROUP MEETINGS, SEMINARS, AND CLASS MEETINGS

Meeting Type	Number of Schools With Each Number of Meetings of Each Type						Schools With At Least One Meeting of Each Type	Total Number of Meetings of Each Type	Total Number of Students Seen in Each Type of Meeting	Average Number of Students Per Meeting
	1	2	3	4	5	6				
Large Group	41	9	3	1	0	1	55	78	6,739	86
Seminar	21	30	17	7	7	3	85	213	4,713	22
Class	13	18	16	13	0	1	61	155	4,251	27
								446	15,703[1]	

[1]This includes some students who attended more than one session. Also, some students who attended only informal sessions are not included in these figures.

The visitors were clearly kept busy for a good part of the day in each school. Across all participating schools there was an average of approximately 4 formal meetings with students per day (446 meetings in 110 schools). When the counselor/staff meetings in 87 schools are added to the total number of formal meetings, the average number of meetings per day is nearly 5 (533 in 110 schools). These figures do not include informal contacts with individual students, principals, and contact persons.

Table 21 shows the combination of seminars, class meetings and large group meetings conducted in schools. These statistics provide a considerable amount of descriptive information about the visits. For example, only 11 of the 110 schools which were visited scheduled all 3 types of meetings. The majority of the 55 schools which did not have any large group meetings did schedule both class meetings and seminars, although 16 scheduled only seminars, and 9 scheduled only class meetings. None of the schools which scheduled multiple large group meetings had both class meetings and seminars as well, and 5 of these schools had neither class meetings nor seminars.

Table 21

COMBINATIONS OF SEMINARS, CLASSES, AND LARGE GROUP MEETINGS

	No Large Groups (55 Schools)	One Large Group (41 Schools)	Two or More Large Groups (14 Schools)	Total (110 Schools)
No Class, One or More Seminars	16	22	6	44
No Seminars, One or More Classes	9	8	3	20
One or More Seminars, One or More Classes	30	11	0	41
No Seminars, No Classes	0	0	5	5

VII. DATA COLLECTION

Since 1978 was a pilot year for the Visiting Women Scientists Program, it was important to determine the program's feasibility and to evaluate its effectiveness. A number of forms were used to gather a great deal of information from students, school personnel, and women scientists. The forms and procedures used in collecting these data are described in the following sections.

A. Schools

A random sample of high schools across the country was sent an introductory letter and a questionnaire (Appendix B) at the start of the program. Each interested school was then randomly assigned to control or experimental groups. Different forms were used to collect data from each type of school. For purposes of data collection, the "extra" schools which were visited were treated the same as the experimental schools.

1. Visited Schools

At the time of the visit, the contact person at each visited school (either experimental or non-sample extra) received a School Contact Person Record of Visit form (see Appendix H) which asked about the time spent in making arrangements for the visit, the performance of the field representative, and any problems encountered (including scheduling difficulties, equipment failure, speakers, etc.).[14]

A month after each visit, the Visiting Women Scientists Program School Contact Person Questionnaire was sent to the contact person in each visited school. This questionnaire asked about the value of the Visiting Women Scientists Program, the use of the resource packet, ordering of other materials, any evidence of the program's impact, and whether the school would be interested in participating again. A copy of this questionnaire is included in Appendix H. A postage-paid envelope was provided for the return of each form.

2. Control Schools

The contact person at each control school was sent a questionnaire (see the Women in Science Careers School Contact Person Questionnaire in Appendix H) approximately one month after the resource packet had been mailed to the school. The questionnaire was brief and asked

about the use of the resource packet and the ordering of materials.[15] As with visited schools, a postage-paid envelope was provided for the return of forms.

3. Follow-Up Procedures and Response Rates

A reminder note with additional forms and another postage-paid envelope were mailed to all schools which did not return their original forms. During the last two months of the school year, if a school's form(s) had still not been received, the school was called (several calls were often necessary) to obtain the needed information.

A School Contact Person Questionnaire was obtained from every control school. School Contact Person Record of Visit forms were completed by all but one of the 110 visited schools (greater than 99 percent response rate) and the School Contact Person Questionnaires which were used to evaluate the impact of the program were obtained from 107 of the 110 visited schools (97 percent). Information about school characteristics was obtained either from survey data or school questionnaires for 167 of the 168 schools involved (including experimental schools, control schools, extra schools which were visited, and sample schools which expressed interest but were not visited).

B. Students

In seminars and classes (vs. large groups) field representatives requested that each student complete a Student Questionnaire (see Appendix G). The students were to indicate grade, sex, their rating of the meeting they attended, the things they liked best and least about the meeting, the program's value to them in various ways, their rating of The Women's Prejudice Film, and any other questions they might have as a result of the program. The questionnaires were collected by the field representative at the period's end and returned to RTI. Completed questionnaires were received from approximately 8,300 students.

All students who participated in the visits and tenth grade female students in the control schools received a sheet of information which had a tear-away postage-paid postcard at the bottom (see Appendix G). Students who desired more information could return the postcard, indicating the types of information desired, their sex and grade. As of the cut-off date of May 31, 1978 more than 3,000 postcards had been returned; approximately

300 of these were from control schools and approximately 2,700 were from visited schools. Postcards received after May 31 were not included in the analyses.

C. Field Representatives

Each of the four field representatives was responsible for documenting her school visits: the number and type of staff attending the counselor meeting, the number of students viewing The Women's Prejudice Film, the location of the resource packet, the types of meetings held, the number of postcards distributed, and any problems experienced. These Field Representative School Visit Records (see Appendix I) were returned to RTI along with the student questionnaires from each school following the circuit of visits.

Field Representative Evaluation forms (see Appendix I) were sent to the field representatives at the program's completion. They used these forms in summarizing their ideas about various aspects of the program including the field trial visits, the program's forms and procedures, the modules, the effectiveness of particular types of meetings, major problems encountered in conducting and scheduling visits, the roles of women scientists, and their role as field representative.

D. Women Scientists

Each woman scientist in the roster initially filled out an application form (see Appendix C) which asked about her educational background, employment, race or ethnic background, etc. Each woman scientist who visited schools and was not a part of the roster was also asked to complete this form.

A Woman Scientist Record of Visit form (see Appendix I) and a postage-paid envelope were included with the materials sent to the women scientists prior to their visits. This form asked about their preparation time, the demonstration that they prepared for their visit(s), their perception of the field representative, their interest in future participation, and any suggestions they might have for improving the program. Record of visit forms were received from all 40 women scientists who participated in the program.

E. Staff Site Visits

In addition to maintaining close telephone contact with the field representatives, RTI central staff attended several visits of each field representative. The purposes of these site visits were (1) to monitor the performance of the field representatives, and (2) to evaluate field procedures and make revisions as necessary.

Central staff visited 13 schools with the field representatives and women scientists. In addition, the NSF project officer accompanied the central staff on 1 of these 13 visits. No major problems were perceived, but a few minor revisions to field procedures were made and communicated to the field representatives.

VIII. EVALUATION OF THE VISITING WOMEN SCIENTISTS PROGRAM

While an important purpose of the Visiting Women Scientists Program was to provide information about women in science careers, it was clear from the outset that a single session with a woman scientist could not possibly fulfill all of the students' information needs. Consequently, encouraging high school females to seek additional information was established as a major goal of the program. This chapter examines the effectiveness of the program by investigating the degree to which students were encouraged to seek additional information. In addition, data provided by students, women scientists, and school contact persons about the value of the program are presented.

A. Student Use of Postcards to Request Additional Information

Each student who participated in the Visiting Women Scientists Program was given a postcard to use in requesting additional information. These cards were color coded to indicate if the school was experimental (buff postcards) or "extra" (blue). A total of 15,563 postcards were distributed in the 110 visited high schools; 4,390 were distributed to tenth grade females in experimental schools, and the remainder were distributed to other students who attended meetings in experimental or extra schools.

The evaluation design included a comparison of the rate of return of postcards from tenth grade females in experimental and control schools. For this reason, field representatives were asked to record the number of postcards distributed to tenth grade females, and the contact person in each control school received a supply of postcards (green to indicate control group) with instructions to distribute the postcards to all tenth grade females in the school.

Based on enrollment figures provided by the schools, it is estimated that 7,597 postcards should have been distributed to tenth grade females in the 40 control schools. However, there is evidence that the postcards may not have been distributed as intended. For example, approximately one-third of the control school postcards which were returned were from persons who were not tenth grade female students. Most of these were from females in other grades; a few were from male students; a few were from guidance counselors; and a few were from persons in other schools. Since the contact persons had received extra postcards, we have no way of knowing if these persons received the postcards in addition to, or instead of, the tenth grade females who should have received them. Also, no postcards were received from tenth grade females in 19 of the 40 control schools, so we cannot be sure that cards were distributed to tenth grade females in these schools.

The rate of postcard return from tenth grade females in experimental schools was 21 percent (934 returned out of 4,390 distributed). In contrast, the rate of return from tenth grade females in the 40 control schools was 3 percent (207 returned out of 7,597). If we consider only those 21 control schools where we are certain postcards were distributed to tenth grade females, the return rate was 5 percent (4,214 distributed). Even with the assumption that one-third of the postcards in these 21 schools were distributed incorrectly to other than tenth grade females, the rate of return is only 7 percent. In any case, the difference between experimental and control schools is statistically significant beyond the .05 level.[16]

B. Specific Types of Additional Information Requested

The students could use the postcards to request any or all of the following 5 types of information:

1. Ways women can combine family life and a successful science career

2. Job opportunities in science and technology for women in the future

3. What it's like "on the job" in a science career

4. What high school courses and college majors are required for science careers

5. How educational expenses might be financed

As shown in Table 22, most female students who returned postcards requested at least 3 types of information; and more than half requested either 4 or 5 types. In contrast, only 10 percent of the males who returned postcards requested as many as 4 types of information. This finding is not surprising when one considers that two of the categories were specific to women.

Table 22

PERCENT OF POSTCARDS REQUESTING 0,1,2,3,4 AND 5 SPECIFIC TYPES OF INFORMATION BY SEX--VISITED SCHOOLS ONLY

		Number of Types of Information Requested					
	N	0	1	2	3	4	5
Female	(2,656)	1	6	14	23	21	35
Male	(84)	6	13	26	44	2	8
Total[1]	(2,764)	1	6	15	24	21	34

[1]Includes 24 students who did not specify their sex.

Table 23 shows the percent of students requesting each type of information, by sex. For females, the most frequently requested information was "job opportunities in science and technology for women in the future" (88 percent), followed closely by "what high school courses and college majors are required for science careers" (84 percent).

Table 23

PERCENT OF POSTCARDS REQUESTING EACH TYPE OF INFORMATION BY SEX--VISITED SCHOOLS ONLY

Type of Information	Female	Male	Total[1]
1. How women combine family and career	49	12	48
2. Job opportunties for women in science	88	13	86
3. What it's like "on the job" in science career	72	69	72
4. High school and college requirements	84	85	84
5. Financing educational expenses	68	70	68
n =	2,656	84	2,764

[1]Includes 24 students who did not specify their sex.

Seventy-two percent of the female students who returned postcards asked for information about what it's like on the job, and 68 percent wanted to know more about how educational expenses might be financed. Relatively few (49 percent) of the female students who returned postcards asked for information on "ways women can combine family life and a successful science career."

In order to determine if older students have different information needs than younger ones, responses of female students were analyzed separately by grade. These results are shown in Table 24. Overall, the differences are minor. The one exception is that twelfth grade females were considerably less likely than female students in other grades to request information about high school courses and college majors required for science careers.

As was demonstrated in the previous section, the Visiting Women Scientists Program was successful in encouraging tenth grade females to seek additional information about women in science careers. Analyses of requests for specific types of information were also performed to determine if the visits had any effect on the types of information which students requested. These results are shown in Table 25. The only difference of any magnitude involves "what it's like 'on the job' in a science career," with respondents from experimental schools more likely than those from control schools to request this type of information (72 percent and 63 percent, respectively).

Table 24

PERCENT OF FEMALES REQUESTING EACH TYPE OF INFORMATION BY GRADE--VISITED SCHOOLS ONLY

Type of Information	Grade 9	10	11	12	Total[1]
1. How women combine family and career	46	47	49	54	49
2. Job opportunities for women in science	83	86	91	89	88
3. What it's like "on the job" in science career	64	71	77	71	72
4. High school and college requirements	88	87	88	69	84
5. Financing educational expenses	71	66	73	65	68
n =	173	1273	771	398	2656

[1]Includes 22 grade 8 students and 19 students who did not specify grade.

Table 15

PERCENT OF TENTH GRADE FEMALES IN EXPERIMENTAL AND CONTROL SCHOOLS REQUESTING EACH TYPE OF INFORMATION

Type of Information	Experimental	Control
1. How women combine family and career	49	44
2. Job opportunities for women in science	85	79
3. What it's like "on the job" in science career	72	63
4. High school and college requirements	86	84
5. Financing educational expenses	63	64
n =	934	207

C. Student and School Use of the Resource Packets

Approximately one month after each visit, the contact person was asked to complete a brief questionnaire about the impact of the Visiting Women Scientists Program and the use of the resource packet. Control schools had also received resource packets, and contact persons in these schools were also asked to complete brief questionnaires. (These questionnaires are in Appendix H.)

Table 26 shows the responses of experimental and control groups to a question about students requesting information about science careers. Fifty-seven percent of the experimental schools, compared to 38 percent of the control schools, indicated that more than the usual number of female students had sought information about science careers. (Experimental schools were asked about requests during the month since the visit, while control schools were asked about the month since they had received the resource packet). This difference between experimental and control schools was significant beyond the .05 level, a second indication that the Visiting Women Scientists Program was effective in encouraging female students to seek further information about science careers.

Contact persons in both experimental and control schools were also asked if the resource packet had been used by each of a number of types of people. Ninety-six percent of the experimental schools and 85 percent of the control schools reported that the resource packet had been used by at least one of these groups. This difference is significant beyond the .05 level.

Table 26

EXPERIMENTAL AND CONTROL SCHOOL COMPARISON OF NUMBER OF FEMALE STUDENTS SEEKING SCIENCE CAREER INFORMATION

	Percent of Schools	
	Experimental	Control
More than the Usual Number	57	38
About the Usual Number	33	50
Less than the Usual Number	0	5
Unknown	9	8
n =	75	40

Use of the resource packet by particular categories of people is shown in Table 27. A majority of both the experimental schools and the control schools (85 percent and 73 percent, respectively) reported that some students had used the resource packet. It appears that sending a resource packet to schools even without visiting them is an effective means of making information available to students. In contrast, sending schools postcards for students to use in requesting information apparently has little effect unless these schools receive visits.

Table 27

EXPERIMENTAL AND CONTROL SCHOOL COMPARISON OF USE OF THE RESOURCE PACKET

Resource Packet Was Used By	Percent of Schools	
	Experimental	Control
Students	85	73
Teachers	57	45
Counselors	68	63
Librarians	24	10
Administrators	7	3
Others	3	3
n =	75	40

Table 27 also shows that some counselors in roughly two-thirds of both the experimental and control schools and that some teachers in roughly half of these schools used the resource packets. Very few of the schools in either group reported that any administrators had used the resource packets. The differences between experimental and control groups in counselor, teacher, and administrator use of the resource packets were not significant. On the other hand, librarians in experimental schools were significantly more likely than those in control schools to make use of the resource packets (24 percent versus 10 percent).

Although most experimental and control schools had used the resource packet, very few of the schools had ordered any of the materials listed in the resource packet or annotated bibliography. Only 7 percent of the

experimental schools indicated they had already ordered materials, and another 12 percent indicated they planned to order some. These results were not significantly different from those in the control schools where 3 percent had already ordered materials and an additional 13 percent planned to do so.

D. Student Evaluations of the Visiting Women Scientists Program

Students who participated in the Visiting Women Scientists Program were asked to complete a brief evaluation questionnaire;[17] a copy of this questionnaire is included in Appendix G. Student evaluations of the program as a whole, as well as their reactions to particular aspects of the visits, are presented below.

Table 28 shows the students' responses to the question "How would you rate the class meeting overall?" broken down by sex and grade. Note that the visits were generally well received, with 84 percent of the students rating the meeting either excellent or good; only 1 percent considered the program poor.[18] Not surprisingly, a larger percentage of females than males considered the meeting excellent (31 and 21 percent, respectively). Within each sex, the percent of students rating their meeting excellent tended to increase with grade range. These ratings are in agreement with the perceptions of the field representatives that juniors and seniors appeared to be more receptive than ninth and tenth graders to information about careers and the need for career planning. However, it should be noted that many of the participating juniors and seniors had been chosen specifically for their demonstrated interest in science and this undoubtedly affected the ratings.

The Visiting Women Scientists Program was conducted by 4 different field representatives and 40 different women scientists; and student ratings varied to some extent according to which visitors they observed.

Table 29 shows student ratings of the program broken down by field representative. While there is some variation in the ratings, the vast majority of the students visited by each field representative rated their meetings either excellent or good.

Table 28

STUDENT RATINGS OF THE VISITING WOMEN SCIENTISTS PROGRAM BY SEX AND GRADE

All Students	Number	Percent of Students Rating Program				
		Excellent	Good	Fair	Poor	Missing
	8,348[1]	29	55	12	1	3
Female						
Grade 9	580	26	62	10	1	2
Grade 10	2,743	27	57	13	1	2
Grade 11	1,966	33	55	8	1	4
Grade 12	1,337	35	53	8	0	4
All Females	6,718[2]	31	55	10	1	3
Male						
Grade 10	566	18	51	22	4	4
Grade 11	485	19	59	17	2	3
Grade 12	419	28	53	15	2	2
All Males	1,554[3]	21	54	19	3	3

[1]Includes 76 students who did not specify their sex.

[2]Includes 92 female students who did not specify grade or who specified grades other than 9-12.

[3]Includes 84 male students who did not specify grade or who specified grades other than 10-12.

Table 29

STUDENT RATINGS OF THE VISITING WOMEN SCIENTISTS PROGRAM BY FIELD REPRESENTATIVE

Field Representative	Number	Percent of Students Rating Program				
		Excellent	Good	Fair	Poor	Missing
1	2,659	21	59	16	2	3
2	2,313	21	59	17	1	3
3	2,314	36	42	10	0	3
4	1,062	40	49	5	1	6

There was no discernible pattern of program ratings based on the characteristics of the women scientists who had participated in the program. When analyzed separately for each of the 40 women scientists, the percent of students rating their meeting excellent varied considerably, from 5 percent to more than 50 percent. However, the group of scientists with the highest ratings and the group with the lowest ratings each included women from a variety of science areas, types of employment, ages, and degree levels. Some of each group were selected from the roster, and some were selected because they had been recommended as particularly effective public speakers who would relate well to high school students. When analyzed separately by woman scientist, the percent of students rating the program either excellent or good varied from 55 to 100 percent, with the majority falling in the 80 to 90 percent range.

As noted earlier, the Visiting Women Scientists Program included three basic types of meetings: all-female large group meetings, all-female seminars, and class meetings (including males and females). Table 30 shows that students who participated in seminar meetings were more likely to rate the program excellent than were those who attended class meetings. Further analysis showed that this was not due simply to the fact that tenth graders were less likely than eleventh and twelfth graders to rate the program excellent. Within each type of meeting there was very little difference in ratings by grade.

Ratings for large group meetings are not presented since most students in these meetings were not asked to complete questionnaires. However, it should be noted that the field representatives and RTI site visitors all felt that the large group was the least effective and the seminar the most effective type of meeting. Also, many women scientists made a similar comment on their Record of Visit form.

Table 30

STUDENT RATINGS OF THE VISITING WOMEN SCIENTISTS PROGRAM
BY TYPE OF MEETING

		Percent of Students Rating Program				
Type of Meeting	Number	Excellent	Good	Fair	Poor	Missing
Class	3,246	26	57	13	1	3
Seminar	3,589	36	54	6	0	4

In addition to rating the Visiting Women Scientists Program as excellent, good, fair, or poor, students were asked to indicate what they liked best and least about their meeting. Eighty-seven percent of the students wrote in at least one thing that they liked best. Thirty-one percent of the students said they liked the explanations about specific careers. Almost half of the students indicated they liked one or another aspect of the speakers and their presentations, including the slides, demonstrations, the fact that new ideas were presented, and the fact that the visitors answered the students' questions. Other topics that were mentioned by some students included: encouraged students to think about the future; showed that women are becoming accepted in careers; and showed how personal lives and careers can be combined.

Only about one-third of the students responded to the question asking what they liked least about their meeting. The most common negative comments were: there was not enough specific career information or there was too much emphasis on one area of science (5 percent and 2 percent, respectively); there was not enough time (5 percent); the presentations were boring (4 percent); and the students were not interested in science (3 percent).

Students were also asked to rate the meeting's value in providing particular types of information. These results are shown in Table 31. The large percentages of missing responses are due in part to the fact that these questions appeared on the back of the questionnaire, and many students left the entire second side blank.

The program was rated either somewhat valuable or very valuable in each of the 5 ways by at least 74 percent of the students. As measured by the percent of "very valuable" responses, the Visiting Women Scientists Program was most successful in communicating the importance of keeping one's options open by taking mathematics and science in high school and in encouraging students to seek further information. It should be noted, however, that while 44 percent of the students indicated the program was very valuable in this last regard, fewer than 20 percent returned the postcards asking for more information about women in science careers.[19]

Table 31

STUDENT RATINGS OF THE VALUE OF THE VISITING WOMEN SCIENTISTS PROGRAM IN EACH OF A NUMBER OF WAYS

	Not Valuable	Somewhat Valuable	Very Valuable	Missing
1. Taught me about a number of careers of which I hadn't been aware	8	48	34	9
2. Showed me that women can successfully combine careers and family lives	15	42	32	11
3. Taught me about the preparation needed for various science careers	10	42	36	12
4. Showed me the importance of keeping my options open by taking science and mathematics courses in high school	8	34	47	11
5. Encouraged me to seek further information about science career opportunities	11	34	44	11
n =		8348		

Students were asked if the Visiting Women Scientists Program had raised any new questions for which they would like answers and, if so, to specify the questions. Most students (89 percent) did not specify any questions. Those who did generally specified a question related to a specific career or the background and education necessary to enter a specific career. Some others wanted to know what it is really like in a science career, why women are just now becoming scientists, and how to handle a career with a family.

Finally, students who had seen The Women's Prejudice Film were asked to rate it, and these results are shown in Table 32. About one-third of the students who completed questionnaires had seen the film; of these, 74 percent rated the film either excellent or good.

Table 32

STUDENT RATINGS OF THE WOMEN'S PREJUDICE FILM

	Percent
Excellent	27
Good	47
Fair	19
Poor	5
Missing	2
n =	3026

E. Interest in Future Participation in the Visiting Women Scientists Program

When asked if they would be interested in participating in the Visiting Women Scientists Program in the future, all 40 women scientists answered "yes" (Woman Scientist Record of Visit in Appendix I). In addition, contact persons were asked whether they would be willing to act as a contact person again if their schools decided to participate in the future (Contact Person Record of Visit in Appendix H). In 98 of the 110 schools, (89 percent) contact persons responded "yes," while those in 5 schools said "no" and 7 did not respond. While the role of the contact person often required a considerable expenditure of time and energy (as discussed in Chapter V), most of the contact persons appear to have accepted the role well.

Approximately two weeks after the visit the contact person received the School Contact Person Questionnaire (Appendix H). The purpose of this form was to evaluate the impact of the program; and the contact persons were asked to consult their colleagues as necessary in order to answer the questions. When asked if the Visiting Women Scientists Program was of value to their students, contact persons in 104 schools (95 percent) said "yes"; 2 said "no" and 4 did not respond. Contact persons were also asked if their schools would like to participate in the future if the program were to be continued. Ninety-nine schools (90 percent) indicated they would like to participate again, 4 said "no," and 7 did not respond.

IX. RECOMMENDATIONS FOR FUTURE VISITING WOMEN SCIENTISTS PROGRAMS

The pilot program was designed to obtain a considerable amount of information about the feasibility and effectiveness of a Visiting Women Scientists Program. Because it was not known in advance which procedures would be most effective, the pilot effort allowed participants a great deal of flexibility in determining the content and structure of each visit. Careful records were kept of the activities conducted and the problems encountered so that future programs might benefit from the experiences of the pilot program.

Based on the data collected from students, school staff members, field representatives, and women scientists, there is a great deal of interest in continuing the Visiting Women Scientists Program. While a number of problems were encountered, overall the program functioned quite smoothly. In addition, comparisons between experimental and control schools demonstrated that the program was effective in encouraging high school females to seek out further information about women in science careers.

Clearly, having a woman scientist role model meet with groups of high school students is only one of many possible approaches to increasing the participation of women in science careers. Alternative approaches which have been suggested include workshops for teachers and counselors to prepare them to assist female students in career decisions, having students spend a day or more with a woman scientist at work, and other more intensive school year and summer programs for students. The pilot Visiting Women Scientists Program examined the feasibility and effectiveness of this one approach; it did not address the issue of whether this program is superior to other possible approaches.

If the Visiting Women Scientists Program is continued, the data collected during the pilot program suggest a number of modifications which could improve the program. Recommendations for modifying the program are presented in the following sections.

A. Scheduling Visits to Schools

Based on feedback from women scientists and field representatives, it is recommended that each circuit consist of visits to 3 schools in a small

geographical area on 3 consecutive days. This will allow the field representative 2 days each week for contacting women scientists and school contact persons for future circuits; it will also make it easier for these people to get in touch with the field representative.

In the pilot program, the principal of each interested school was asked to indicate specific days the school would not be in session. However, there were often a number of other days (e.g., testing days) when visits would be inconvenient or ineffective. It is recommended that more information about possible days for the visits be obtained from each school, in order to give the schools as much voice as possible in determining the scheduled date. In addition, to assist the field representatives and women scientists in preparing for the visits, it is recommended that principals be asked to provide information about the socioeconomic composition of the school and the percentages of students who go on to college.

Steps should also be taken to ensure that the schools are given as much written advance notice of the visit date as possible. Similarly, the field representative should telephone the school contact person very soon after written notification of the visit date is sent. This will give the contact persons an opportunity to ask any questions they might have about the program, and it will provide ample time for making arrangements for the visit.

B. Obtaining Women Scientists

The roster developed for the pilot program includes more than 600 women scientists who have expressed an interest in participating in the Visiting Women Scientists Program. This roster could be used in selecting women for future programs. If the roster contains an insufficient number of women scientists in a particular geographic area or if the desired balance of characteristics cannot be obtained by selecting women from the roster, additional names can be obtained either by announcing the specific needs in industrial and professional organizations' newsletters, or by asking appropriate persons for suggestions.

It is recommended that all potential visitors receive written information about the program, including a copy of the pilot program Highlights Report, before they are contacted about conducting visits so that they have a good idea of the commitments involved in participation. It is further recommended

that women scientists be contacted as early as possible to allow them adequate time to prepare for the presentations and to enable them to more easily rearrange their schedules.

As mentioned earlier, a number of schools expressed interest in having a list of women scientists in their area who might be willing to visit them. To accommodate these requests, it is recommended that a roster be compiled of women scientists who are willing to have their names released to schools for this purpose.

C. Program Goals Related to Target Audiences and Types of Meetings With Students

Most school personnel and women scientists were very favorable about the accomplishment of the major objectives of this program: (1) to raise the consciousness level of tenth grade females at a time when they can still redirect their high school program to include more mathematics and science; and (2) to reinforce in high school females who have shown an interest in science the notion that women can have successful science careers, and that they can combine their science careers with fulfilling personal lives.

No one in the pilot program thought that it was inappropriate to focus on tenth grade females for consciousness-raising activities or on eleventh and twelfth grade females for reinforcement activities. However, a number of contact persons and women scientists suggested expanding the program to other grades and age levels, including the entire range from elementary school through college. These suggestions were about equally divided between those who think the earlier one gets to the students the better, and those who think that older females are the most receptive to the program.

No one program would be appropriate for all audiences. However, the Visiting Women Scientists Program would be appropriate for ninth graders, and it is recommended that the Visiting Women Scientists Program be expanded to include ninth grade females as a target audience, along with tenth graders, for consciousness-raising activities. The same activities are appropriate for both groups, and ninth graders are in an even better position for redirecting their high school programs to include more mathematics and science. This would be operationalized by including ninth graders from schools with both ninth and tenth grades and by including junior high schools in the pool of eligible schools.

In order to provide an opportunity for as many ninth and tenth grade females as possible to meet a woman scientist role model, it is important that one or two large group meetings be scheduled. Even though the large group meetings were not considered to be as effective as other types of meetings (see Chapter VIII), they are a cost-effective means of raising the consciousness level of a great number of ninth and tenth grade females. It is also important that the ninth and tenth grade females who express a deeper interest in science be provided an opportunity to meet with the visitors in a smaller, more informal setting where they can ask specific questions. Finally, it is important that the eleventh and twelfth grade females who have shown an interest in science have an opportunity to meet with the visitors in an all-female seminar, in order to best implement many of the program objectives (see Chapter VI).

During the pilot program, schools were presented with a list of proposed activities from which they established a schedule of activities for the visit. Half of the schools scheduled at least one large group meeting, and more than 75 percent scheduled at least one all-female seminar. Based on responses from school contact persons, these large group meetings and all-female seminars are clearly feasible in most high schools and do not create undue burdens on the schools which schedule them.

It is recommended that initial correspondence with the principal about school participation describe the program as including (1) at least one large group meeting with ninth and/or tenth grade females; (2) an all-female seminar of ninth and/or tenth grade females following each large group meeting, composed of students who attended the large group meeting and who have an interest in asking specific questions of the visitors; and (3) all-female seminars for eleventh and twelfth grade students interested in science. Most schools which have an interest in the goals of the Visiting Women Scientists Program will be able to accommodate these meetings, and the field representative will still maintain a degree of flexibility in arranging scheduled activities when specific problems arise in a participating school.

All of the field representatives and a number of women scientists and contact persons considered it necessary to have at least 50 minutes or more to conduct a successful large group meeting or seminar. It is recommended that the initial correspondence with the principal also indicate that a minimum of 50 minutes be scheduled for each program meeting.

D. Roles of the School Contact Person, Woman Scientist and Field Representative

The basic roles conceptualized for the school contact person, the woman scientist and the field representative worked extremely well in implementing the school visits. A vast majority of school contact persons and women scientists responded that they would be willing to conduct these activities again, and both groups were very positive about the role of the field representative. As anticipated, field representatives helped avoid major logistical problems and considerably reduced the burden on participating schools and women scientists. The role of the field representative is considered to be essential in conducting successful visits, especially for large-scale programs. Based upon the overall success of the pilot effort, it is recommended that the roles of the contact person and the woman scientist also remain essentially the same as in the pilot program.

E. Communication With School Staff

With the exception of the letter and materials sent to the school contact person, the only communication planned with school staff was the meeting with counselors, teachers and other school personnel. This meeting was envisioned as an opportunity for the field representative and woman scientist to meet with an interested group of staff members to discuss various aspects of the program. As was discussed in Chapter VI, this meeting was not arranged in 23 of the 110 schools (21 percent); and because of difficulties related to school schedules, many of the meetings were rather short and/or did not include key representatives, especially from the teaching staff.

One of the weaknesses in the pilot program was the fact that no materials were provided in quantity for distribution to teachers and other school staff members. While the contact person had been given announcements to post about the program, in many cases those who attended the counselor meeting were uninformed about the purposes of the Visiting Women Scientists Program in general, and the meeting in particular.

To remedy this lack of information in future programs, it is recommended that a pamphlet be prepared specifically for staff members in participating schools. School contact persons would be provided with copies for distribution to staff members. The pamphlet would describe the

program's purposes and present an overview of the types of activities which take place in schools, including a description of the resource packets to be left at the school. Space would be provided for the date of the visit and the names of the field representative, woman scientist, and school contact person.

It is further recommended that the meeting generally be scheduled at a time which is convenient for staff members, e.g., just prior to, or just after, school. Interested staff members could attend, and some schools might wish to specifically invite career counselors and representatives from the science, mathematics, and social science departments. Since information will have already been distributed to participants, the field representative could very briefly describe the purposes of the program and the contents and location of the resource packets. The field representative could also explain the modules, which will have been revised for use by teachers (see Section F below), and make them available to interested staff members. When it is considered relevant and appropriate, the school librarian and/or guidance counselor can briefly describe the science career materials and resources which are available at the school. An informal discussion can then proceed as to how the school staff might reinforce the program goals after the visit.

F. The Modules

The modules which had been developed for use in seminars and class meetings during the pilot program were not extensively used as such, although many of the concepts (such as the importance of science and mathematics prerequisites) were incorporated into the presentation by the field representative. Most meetings included the field representative's introductory remarks, the woman scientist's demonstration or presentation, a short question and answer session, and the completion of student questionnaires. In such meetings, there was seldom time for additional activities; however, data provided by the field representatives indicated that a few of the modules, while used only infrequently, were quite appropriate in situations where (1) meeting activities needed to be varied either because many students had attended a previous meeting or the field representative and woman scientist needed a change of pace after many consecutive meetings, or (2) school visits were conducted solely by a field representative.

It is recommended that the modules which were used most successfully be revised based upon information obtained during the pilot program. In addition, since a number of contact persons and other school staff members asked for copies to use with students, it is recommended that materials describing their use be prepared. Copies of the modules could then be made available to interested staff in participating schools.

G. The Resource Packet

Distribution of resource packets of materials proved to be a cost-effective way of making relevant information available to students and school personnel. In many cases, however, the schools indicated they would have liked additional copies of the materials to place in various locations. It is recommended that each school receive 2 resource packets. The contact person would be asked to place one resource packet in the guidance office and the second in another appropriate location, such as the science department or school library. A limited number of additional copies of the resource packet (up to 3 per school) should also be made available to schools upon request.

H. Need for Career Information Materials

Data collected from students, schools, and women scientists indicated a need to include in the program as much information as possible about specific careers in science and technology. As noted in Chapter VII, many of the participating students particularly liked the visitors' explanations of specific careers; and a number of students responded that there was not enough specific career information included in the program. In addition, some women scientists noted that field representatives should be better prepared to respond to student questions about specific careers.

It is recommended that field representatives receive more intensive training related to specific career information and that during the visits they have available detailed information describing various careers, course requirements, etc. In addition, materials defining particular careers should be included with the resource packet and with the modules which are made available to teachers. Finally, the field representative should be reminded to refer students to the resource packets and other available resources in the school, giving examples of how to locate certain information in, for instance, the Occupational Outlook Handbook.

Based on comments made during the pilot program, it appears that there is a great need for well designed materials which present information about science careers. As noted in Chapter VI, school staff members expressed the need for updated information about science careers and for materials which could be used by students. It is recommended that NSF consider developing a number of different types of materials including a newsletter containing science career information, a film depicting women in science careers, posters of women scientists, and other appropriate materials.

I. The Women's Prejudice Film

Several problems were encountered in providing this film to participating schools and only 83 of the 110 schools had shown the film by the time of their visits. A number of schools did not receive the film a week before their visit, as had been intended; and some received it so late they were unable to have students view it prior to the date of the visit. In addition, the subcontractor responsible for distributing the film sometimes failed to include return postage with the film as had been arranged, causing inconvenience to the contact persons and field representatives.

Some school staff members considered the contents of the film to be inappropriate; in a few cases counselors and/or teachers previewed the film and decided not to show it to their students. Although student reactions to the film were generally favorable, the logistical problems relating to its use were considerable. It is therefore recommended that the use of this film as an integral part of the Visiting Women Scientists Program be discontinued. In the pilot program this film and 3 films specific to women in science careers were described in the annotated bibliography which was included with the resource packet; information on how to order the films for use in the school was also provided. It is recommended that this information continue to be provided and schools be made aware that preview copies can be easily obtained.

J. Press Contact

There was more contact with the press (both newspaper and television) during the visits than had been anticipated. The goals of the Visiting Women Scientists Program were perceived as very timely and appropriate

by school personnel involved in scheduling the program, and many of them contacted local news agencies about possible coverage during the visit. At many schools a newspaper reporter took pictures, observed part of the visit, and interviewed program and school personnel; in several schools there was also television coverage.

The field representatives and women scientists generally did an excellent job during the interviews. They often provided news representatives with existing pamphlets which described various aspects of the program. However, in retrospect, it would have been best to have had a clear statement of policy on press contact and press releases for news personnel.

It is recommended that appropriate guidelines be established with the NSF Program Manager concerning press contacts. Field representatives and women scientists can then be made aware of these guidelines prior to school visits. It is further recommended that an appropriate press release be written and that schools be encouraged to request coverage by the news media in their areas.

K. Evaluation

The pilot program demonstrated that the Visiting Women Scientists Program is both feasible and effective in meeting its goals and objectives. Therefore, if the program model remains essentially the same, there will be no need to conduct experimental-control comparisons. It will still be advisable to keep a record of the activities conducted in order to describe the program, and to collect appropriate data from program participants to insure that the program is implemented successfully. In addition, it is recommended that consideration be given to recontacting schools which participated in the pilot program in order to determine if the visits have any long term impact.

Footnotes

[1]"The Development of a Visiting Women Scientists Program for Secondary Schools: Phase I Final Report." National Science Foundation, Washington, D.C., October 1977.

[2]For the purposes of the survey, a high school was defined as any school which included one or more of the grades 10-12. While most of these were 9-12 or 10-12 schools, a number of schools included grades 7-8 or grades K-8 as well.

[3]Since this estimate is based on responses of a sample rather than the entire population of high schools in the nation, it is subject to sampling variability. This means that if another sample of schools were to be contacted, one would not expect the results to be exactly the same. Given the sample design used in the survey, it is estimated that the sampling error associated with the estimate of 39 percent is 4.3 percent. As a result, the 95 percent confidence interval for the percent of schools in the nation interested in participating in the Visiting Women Scientists Program is roughly 30 to 48 percent.

[4]One school was selected as a control school from each 2-, 3-, and 4-school cluster. Either 1 or 2 control schools were selected from each 5-school cluster, depending on the number drawn from a random number table. Finally, 2 control schools were selected from each 6-school cluster.

[5]Approximately 20 percent of the women scientists who completed application forms said they could only visit 3 to 5 schools if the days were not consecutive; these scientists were considered in cases where no one woman scientist could visit the entire circuit.

[6]EPIE Career Education S#E#T# Volumes 1 and 2, EPIE Institute, New York, N.Y., 1975.

[7]Career Education in the Public Schools 1974-75: A National Survey, Donald H. McLaughlin, American Institutes for Research, Palo Alto, CA, 1976.

[8]Career Exploration Project for High School Senior Women, Final Report, Walter S. Smith, Kala M. Stroup and Barbara M. Coffman, Emily Taylor Resource and Career Center for Women, Lawrence, KS, 1975.

[9]"Women in Science", Dinah L. Moché developed at Queensborough Community College, Bayside, N.Y. through an NSF Grant, available through AAPT, SUNY-Stonybrook, N.Y., 1975.

"Space for Women," Center for Astrophysics, Harvard University, Cambridge, MA, 1976.

"Careers in Chemistry Today," American Chemical Society, Washington, DC, 1976.

"Women in Engineering It's Your Turn Now," University of Illinois at Urbana-Champaign, IL, October, 1973.

"I'm Madly in Love With Electricity," Nancy Kreinberg, Lawrence Hall of Science, University of California, Berkeley, CA, 1977.

"Careers Non-Traditional," Pamela Ayre, Patricia M. Lemaire (editors), American Chemical Society, Washington, DC, 1974.

[10]Occupational Outlook Handbook, U.S. Department of Labor Bureau of Labor Statistics, Washington, D.C., 1976.

[11]The two women scientists who visited 5 schools conducted visits to 4 schools in 1 circuit and to an additional school in a second circuit where the originally scheduled woman scientist had to cancel at the last minute.

[12]In the five circuits (18 schools) for the three-week period beginning January 23, RTI central staff called the school contact people to confirm the date and to establish the detailed schedule of activities.

[13]In the Woman Scientist Record of Visits (Appendix I), the women scientists were asked approximately how much time they had spent in preparation for the visits. The responses ranged from 2 hours to 3 days, but most women scientists recorded that they had spent 6 to 8 hours in preparation.

[14]Experimental schools which did not respond to the National Science Foundation Survey of Science Mathematics and Social Studies Education also received a School Questionnaire (see Appendix H) to provide information regarding school characteristics.

[15]Control schools which did not respond to the National Science Foundation Survey of Science Mathematics and Social Studies Education also received a School Questionnaire (see Appendix H) to provide information regarding school characteristics.

[16] T-tests were performed using the formula:

$$t = \frac{\bar{P}_e - \bar{P}_c}{\frac{\Sigma (P_{ie} - \bar{P}_e)^2}{n_e (n_e - 1)} + \frac{\Sigma (P_{ic} - \bar{P}_c)^2}{n_c - (n_c - 1)}}$$

where $\bar{P}_e$ is the average percent of return by school for the experimental group and $\bar{P}_c$ is the average control school percent return.

[17]Actually only 8,348 of the 15,563 students who participated in the program completed questionnaires. To avoid logistical problems, questionnaires were often not distributed in large group meetings. Also, time constraints prevented the use of questionnaires in some class and seminar meetings. Finally, a few students may not have handed in their questionnaires. Weights were assigned to the questionnaires within each school in order to compensate for these types of sampling and nonresponse. In a few cases, no questionnaires were received from a school and nonresponse adjustments were made using another school in the same circuit.

[18]Using the meeting as the unit of analysis, the mean rating (where 1 = excellent) for the 323 meetings in which questionnaires were distributed was 1.78 with a standard deviation of .32.

[19]The total rate of postcard return in visited schools was 18 percent; for tenth grade females in experimental schools it was 21 percent.

APPENDIX A

Letters to Chief State School Officer
and Superintendent

RESEARCH TRIANGLE INSTITUTE
POST OFFICE BOX 12194
RESEARCH TRIANGLE PARK, NORTH CAROLINA 27709

CENTER FOR EDUCATIONAL RESEARCH AND EVALUATION

12 September 1977

Dear Chief State School Officer:

The National Science Foundation (NSF) is planning to support a pilot Visiting Women Scientists Program during the spring semester of the 1977-78 school year. The program, to be conducted by the Research Triangle Institute, is aimed at encouraging high school girls to consider careers in science and technology. I am enclosing a brochure which describes the program in more detail; brief questionnaires would be used to help evaluate the program.

NSF would like to offer the program to the approximately 400 high schools across the country which were selected for the 1976-77 NSF Survey of Science, Mathematics, and Social Studies Education. A list of the schools in your state which would be contacted is enclosed. Participation is completely voluntary; schools which do not respond and those which indicate lack of interest will not be recontacted. We anticipate that approximately 100-120 schools across the country will participate in the Visiting Women Scientists Program.

A description of the procedures to be used in this program was submitted to the CEIS Data Acquisition Subcommittee. The Subcommittee Chairman indicated that "CEIS has no concerns about the pilot Visiting Women Scientists Program." I am enclosing a copy of the CEIS Documentation of Detail Study and Recommendation Form which was completed in response to NSF's request for approval of this program.

Our plan is to contact the schools in late September, and to schedule visits to interested schools during the period January-April, 1978. If you have any questions or concerns, or if there are any special procedures you would like us to use in contacting schools in your state, please call me (collect 919-541-6317).

Thank you for your cooperation.

Sincerely,

Iris R. Weiss

Dr. Iris R. Weiss
Project Director
Visiting Women Scientists Program

IRW:bb

cc: Mr. Ed Allen
CEIS Coordinators

Enclosures

(919) 541-6000 FROM RALEIGH, DURHAM AND CHAPEL HILL

RESEARCH TRIANGLE INSTITUTE
POST OFFICE BOX 12194
RESEARCH TRIANGLE PARK, NORTH CAROLINA 27709

CENTER FOR EDUCATIONAL RESEARCH AND EVALUATION

September 28, 1977

Dear Superintendent,

The National Science Foundation is supporting a program to encourage high school girls to consider and pursue careers in science and technology. The program involves women scientists from a variety of careers in mathematics, engineering, and social science, as well as chemistry, physics, biology, etc. They will visit a sample of schools across the country to present information about career opportunities and the steps necessary to prepare for these careers.

Plans for the Visiting Women Scientists Program have been submitted and approved by the Committee on Evaluation and Information Systems (CEIS); and the Chief State School Officer in your state is aware that your school system may be involved in this program.

The following schools in your district will be contacted shortly and asked if they would like to participate in the Visiting Women Scientists Program. A copy of the letter which will be sent to the principals is enclosed. If you have any questions, please feel free to contact me [collect (919) 541-6317].

Sincerely,

Iris R. Weiss

Dr. Iris R. Weiss
Project Director
Visiting Women Scientists Program

IRW:cr
Enclosure

77

(919) 541-6800 FROM RALEIGH, DURHAM AND CHAPEL HILL

APPENDIX B

Letter and Questionnaire to
Sample School Principals

RESEARCH TRIANGLE INSTITUTE
POST OFFICE BOX 12194
RESEARCH TRIANGLE PARK, NORTH CAROLINA 27709

CENTER FOR EDUCATIONAL RESEARCH AND EVALUATION

Dear Principal:

The National Science Foundation (NSF) is supporting a program to encourage high school girls to consider and pursue careers in science (including social science, mathematics, and engineering as well as biological and physical science).

A pilot Visiting Women Scientists Program will be conducted by the Research Triangle Institute (RTI) under contract to NSF during January-April, 1978. The purpose of this letter is to determine if your school wishes to participate in this program. The Visiting Women Scientists Program is being offered to those schools which participated in last year's NSF Survey; the Chief State School Officer in your state is aware that you are being contacted about participation in this program.

The enclosed brochure describes the Visiting Women Scientists Program in some detail. Typically, two women scientists will visit a school for a full day. They will visit several classes, and meet with interested counselors, librarians, and teachers. Also as part of the program, students will be given the opportunity to send for a pamphlet about women in science careers; and a resource packet containing additional information about science careers, financial aid, etc. will be given to the guidance department.

If you are interested in participating in this program, you will be asked to designate a "contact person" who will work with the women scientists in scheduling, planning, and conducting a visit which will be valuable to the participants without causing undue disruption to the normal operations of your school. Brief questionnaires will be given to some of the participants so they can evaluate the program. A highlights report summarizing the results of the entire pilot program will be sent to each participating school at the conclusion of the program. We feel that the Visiting Women Scientists Program will be a valuable contribution to your ongoing career education activities and look forward to the opportunity to provide this service to your school.

Please complete the enclosed questionnaire (blue) and return it to RTI in the postage-paid envelope that has been provided for your use. If you are not interested in the program, please indicate this fact (Question 1) and return the questionnaire.

Sincerely,

Iris R. Weiss

Dr. Iris R. Weiss, Project Director
Visiting Women Scientists Program

IRW:bb
Enclosures
(cc: District Superintendent)

O.M.B. No. 099-S-77014
Approval Expires 5/31/82

VISITING WOMEN SCIENTISTS PROGRAM
SCHOOL QUESTIONNAIRE

1a. Please indicate if your school is interested in participating in the Visiting Women Scientists Program.

(Circle one)

Yes	1	Go to Q.2a
Undecided.....	2	Go to Q.2a
No	3	Go to Q.1b

1b. Please indicate the reason(s) and return the questionnaire to RTI.

_____

_____

2a. The brochure accompanying this questionnaire describes some activities which are tentatively planned for the visit to each school. Please indicate if each of the activities would be feasible in your school.

(Circle one)

	Feasible	Not Feasible
1. Meeting of up to 150 10th grade female students	1	2
2. Visit to one or more individual 8th, 9th, or 10th grade science or mathematics classes	1	2
3. Visit to advanced class	1	2
4. Seminar for a small group of interested female students	1	2
5. Counselor/librarian meeting	1	2

2b. Please comment about any activities which you indicated are not feasible.

_____

_____

_____

_____

3. How many students in your school are in each of the following grades?

8	9	10	11	12

(OVER)

4. Approximately what percent of the students in your school are in each of the following categories? (Answers should total to 100%)

a.	White or Caucasian	a. _____
b.	American Indian	b. _____
c.	Black, Afro-American or Negro	c. _____
d.	Mexican American or Chicano	d. _____
e.	Puerto Rican	e. _____
f.	Other Latin-American Origin	f. _____
g.	Oriental or Asian American	g. _____
h.	Other	h. _____
		100%

5. Does your school have an auditorium large enough to accommodate all of your 10th grade female students?

(Circle one)

Yes ..... 1 Go to Q.7
No ..... 2 Go to Q.6

6. How many students can be accommodated in a single room? _____

7. How many guidance counselors are there in your school? _____

8. Would it be possible to have all interested science and mathematics teachers attend a single meeting, either during the regular school day, during lunch, or before or after school?

(Circle one)

Yes 1
No 2

9. Please list any dates during the period January-April, 1978 on which your school will not be in session.

_____

10. Please provide the name, title, and phone number of the person we should contact to discuss details of the program, scheduling the visit, etc. This person should be available to assist the women scientists during the visit.

Name_____

Title_____ Phone Number_____

Please return this questionnaire to RTI in the enclosed postage-paid envelope.

THANK YOU FOR YOUR COOPERATION.

APPENDIX C

Letter, Application Form, and Brochure Sent to Potential Visiting Women Scientists

RESEARCH TRIANGLE INSTITUTE
POST OFFICE BOX 12194
RESEARCH TRIANGLE PARK, NORTH CAROLINA 27709

CENTER FOR EDUCATIONAL RESEARCH AND EVALUATION

Dear Colleague,

The National Science Foundation is planning to support a Visiting Women Scientists Program aimed at encouraging high school girls to consider and pursue careers in science (including social science, mathematics and engineering as well as biological and physical science). The program will be conducted by the Research Triangle Institute (RTI) of North Carolina on a pilot basis during the period January through April, 1978. If successful, the program may continue in future years.

Approximately 30 women scientists will participate in the pilot program. Each participant will visit 3-4 schools in her own geographic area, usually spending an entire day in each school. She will generally speak to a group of female students, visit one or more classes, and meet with groups of interested students, teachers, and counselors. Expenses will be paid, and an honorarium will be provided. Each woman scientist will be accompanied by an RTI employee who will be responsible for scheduling the visits, making travel arrangements, and supplying audio-visual materials. This person will also be well versed about job opportunities and labor projections in a wide variety of science areas and will be able to assist the woman scientist in preparing for and conducting the visits.

The purpose of this letter is to identify women scientists who are interested in and available for participation in the Visiting Women Scientists Program. The names of people who will receive application forms were obtained either 1) randomly from membership lists of national professional organizations, 2) through recommendations of various individuals and organizations throughout the country, or 3) from women scientists' responses to announcements of the program placed in a number of professional journals and newsletters.

Women scientists who participate in the program should possess the following qualifications:

- Be interested in increasing the participation of women in science careers;
- Relate well to high school students;
- Be effective public speakers; and
- Be available to spend 3-5 days visiting high schools during the period January-April, 1978.

(919) 541-6000 FROM RALEIGH, DURHAM AND CHAPEL HILL

If you meet these qualifications and are interested in participating, please complete the enclosed application form (green) and return it to RTI in the postage-paid envelope which has been provided. (If you received duplicate materials, please complete only one application form and enclose the blank form along with it.)

Thank you for your cooperation. If you have any questions, please call Ms. Carol Place at RTI [collect (919) 541-6319].

Sincerely,

Iris R. Weiss

Dr. Iris R. Weiss
Project Director
Visiting Women Scientists Program

IRW:cr

Enclosures

O.M.B. No. 099-S-77014
Approval Expires 5/31/82

VISITING WOMEN SCIENTISTS PROGRAM APPLICATION FORM

Completion of this form is entirely voluntary; it is an indication of your interest in serving as a Visiting Woman Scientist. The group of scientists who will visit the schools must include women with a variety of educational and occupational experiences as well as differing individual and family characteristics. Several of the questions on this form will help us ensure this balance. Your responses will be kept strictly confidential.

Name: _____

Home Address: _____

City: _____ State: _____ Zip Code: _____

Telephone: Area Code: _____ Number: _____

Business Title: _____ Name of Employer: _____

Business Address: _____

_____

City: _____ State: _____ Zip Code: _____

Business Telephone: Area Code: _____ Number: _____

1. Please classify yourself into *one* of the following broad areas of "science."

(Circle only one.)

Biological Science 1
Physical Science 2
Engineering 3
Mathematics 4
Social Science 5

2. More specifically, what is your major field (e.g., bacteriology, anthropology, mechanical engineering, biophysics, etc.)?

Major field: _____

3. Please list the degrees you have obtained, the year of award, and your major field for each.

	Degree	Year	Major Field
a.			
b.			
c.			

4. How do you describe yourself?

(Circle only one.)

American Indian 1
Black, Afro-American or Negro 2
Mexican American or Chicana 3
Puerto Rican 4
Other Latin-American Origin 5
Oriental or Asian American 6
White or Caucasian 7
Other 8

(over)

5. Are you presently married?

(Circle one.)

Yes 1
No 2

6. Do you have any children who live at home with you?

(Circle one.)

Yes 1
No 2

7. What is your present employment status?

(Circle one.)

Full-Time 1
Part-Time . . . . . 2 } *(Go to Q. 8)*
Not Employed . . . . . 3 *(Go to Q. 10a)*

8. Which of the following best describes your present employment?

(Circle only one.)

Academic 1
Non-Profit Organization 2
Profit-Making Organization 3
Government 4

9. Briefly describe your job activities in the space below.

_____

_____

_____

10a. Will you be available to visit approximately 3-4 high schools on 3-5 <u>consecutive days</u> during the period January through April 1978?

(Circle one.)

Yes 1
No 2

10b. Will you be available to visit schools on 3-5 days during that period if they do not have to be consecutive days?

(Circle one.)

Yes 1
No 2

11. In your opinion, what types of information should be conveyed to high school females during the Visiting Women Scientists Program?

_____

_____

_____

_____

_____

12. Please attach a copy of your résumé if you have one available.

NATIONAL SCIENCE FOUNDATION

VISITING WOMEN SCIENTISTS PROGRAM

1977-78

Conducted by
Center for Educational Research and Evaluation
Research Triangle Institute
Research Triangle Park, North Carolina

BACKGROUND

At the present time there is a scarcity of women pursuing careers in science and technology. Women represent about 40 percent of all in professional and technical occupations, but as of 1974 women comprised only 14 percent of the science labor force. These statistics reflect the fact that the majority of professional women are employed in teaching, nursing, and other fields which have been traditionally open to women. Recent legislation has increased pressure for affirmative in hiring women in various fields, including science, and the resulting attempts to locate qualified women have highlighted the scarcity of women who have been adequately trained in the sciences and technology.

The reasons for the lack of qualified women available for careers in science and technology are rooted in a complex interaction of economic forces, education, counseling, and family and societal tradition. The lack of participation of women in science is primarily a cultural rather than a biological problem, as evidenced by the fact that women comprise a much greater proportion of the science labor force in some other countries.

Certainly early stereotyping plays an important role. Sex role stereotyping often begins early in a child's life and is reinforced by our educational system. Many instructional materials depict women only in traditionally female roles, and parents and teachers expect girls to lack interest in science and mathematics. Additional barriers to the participation of women include: (1) many high schools females are not aware that a very high percentage of women will work for a large part of their lives; (2) high school females often lack knowledge about career opportunities in science and technology; (3) there are relatively few women who are suitable role models; and (4) some young women anticipate insurmountable difficulties in combining successful science careers and home lives in future years. As a result of all of these obstacles, high school females are less likely than their male counterparts to consider careers in science or to elect the science and mathematics courses which are essential precursors to these careers.

THE VISITING WOMEN SCIENTISTS PROGRAM

The Visiting Women Scientists Program is an attempt to increase the participation of women in careers in science and technology by: (1) giving high school females an opportunity to see and interact with women scientists, (2) providing information about career opportunities in science and technology and about the preparation needed for such careers; and (3) presenting examples of ways in which women scientists are successfully combining science careers and family lives. The National Science Foundation is supporting a Visiting Women Scientists Program to encourage high school girls to pursue careers in science, including biological science, physical science, social science, mathematics, and engineering. The program is being conducted on a pilot basis during the 1977-78 school year, with visits to approximately 120 high schools; and depending upon the success of the pilot effort, the Visiting Women Scientists Program may become a continuing program during future years.

As part of this program, women scientists will visit high schools and discuss the diversity of career opportunities and the variety of alternative life styles that are available to young women seeking careers in science and technology. In addition to making presentations to large groups the women scientists will be available to visit classes and meet with interested students, teachers, and counselors on an individual or small group basis. Students and school staff members will also be given assistance in obtaining additional resources including pamphlets, films, games, and bibliographies for further study.

FOR MORE INFORMATION

Dr. Iris R. Weiss, Project Director
Visiting Women Scientists Program
Research Triangle Institute
Box 12194
Research Triangle Park, NC 27709

APPENDIX D

Introductory Letter Sent to Field Representative
Before the Training Session

RESEARCH TRIANGLE INSTITUTE
POST OFFICE BOX 12194
RESEARCH TRIANGLE PARK, NORTH CAROLINA 27709

December 30, 1977

[Field Representative's
Name and Address]

Dear [Field Rep.]:

Welcome to your new job as Field Representative for the Visiting Women Scientists Program. As you know, the training session will be at RTI from 9:00 a.m. Tuesday, January 17 through 3:00 p.m. Friday, January 20. Please plan to arrive in the evening of the 16th. We have made reservations at the Triangle Motel at the Raleigh-Durham Airport for the nights of the 16th - 19th. Let's plan to meet for breakfast in the lobby of the motel at 9:00 a.m. on Tuesday.

You will soon be receiving a travel advance to pay for the trip to the training session. We will go into detail at the training session about receipts you will need, how to document expenses, etc. For the training session trip, be sure to save your hotel and your plane ticket. Keep track of the amounts you spend for meals, tips, taxis, etc. each day; you will not need receipts for these items. Also you will be doing some traveling to schools prior to the training session; keep a record of the number of miles you drive.

Your period of employment begins on January 1, 1978 and continues until April 30, 1978.

While the training session will not begin until January 17, there are a number of things we would like you to do prior to that time. These are described below. Please contact Carol immediately if you have any questions.

During the first week in January we would like you to schedule visits to two high schools in your immediate area; the visits should take place during the second week in January. Start by contacting either the principal or the superintendent (if you know the principal you'll do better to start there), but be sure to get both of these people's approval before visiting the school. You can inform them that their Chief State School Officer has approved of this program and that they can verify that fact by contacting the CEIS Coordinator. Stress that this is a service to the school aimed at providing information about science careers to young women. Give them a copy of the brochure if they want one. Have them call Carol Place (collect 919-541-6319) if they have any questions about the program which you can't answer. If you're having trouble setting up these field trials, let Carol know immediately and she'll try to help out.

(919) 541-6000 FROM RALEIGH, DURHAM AND CHAPEL HILL

Try to schedule 3 class meetings and 1 seminar in each school. The seminar should consist of 10-20 female students who are particularly interested in science and/or mathematics. If the school won't let you schedule a seminar, ask them to schedule a 4th class. One of the classes in each school should be in a subject area appropriate for the demonstration you develop (discussed elsewhere in this letter); the others should be sophomore mathematics classes if possible.

Before you visit the schools you need to become familiar with the activities you will be conducting during these preliminary visits as well as during the actual program visits. Your resources for this are the Preparatory Work Packet (blue cover) and the modules (RTI cover). It is important that you not refer to any materials in the modules while doing the preparatory work unless specifically told to.

1. Write the job title for each of the jobs listed on page 1 of the preparatory work packet, then redo using the letters from the "JOB TITLES" sheet (green) in Module 1. Read over Module 1, and become familiar with the present and projected employment statistics. You will be trying out the matching exercise in the field trials. The pictures will be given to you at the training session.

2. Read over Module 2. To get the feel of what we will expect a woman scientist to do, we would like you to develop a 10 to 15 minute demonstration of a work activity in a science field, preferably but not necessarily your own field. (Remember that the Visiting Women Scientists Program defines science to include mathematics, engineering, and social science as well as biological and physical sciences.) Pick an activity that you think will interest high school students and requires only those materials which you can bring to the school. (It is possible but risky to arrange to have the needed materials available in the classroom.) Bring the materials with you to the training session.

3. Study the profiles in Module 3 so you can mention some of them as examples as appropriate. These profiles are illustrative only. You should also feel free to use examples of people you know about, but be very careful not to appear to advocate any particular life style. The point is that a diversity of arrangements are possible. (The slides referred to in Module 3 will be provided at the training session.)

4. Read Module 4. Then on page 2 in the preparatory packet develop 2 of your own examples complete with a list of types of scientists and what each might do in solving the problem. You will be trying this module out in 2 classes; once using the matching exercise in Module 1 as an introduction and once without it. It is up to you whether to use the examples we provided, your own examples, and/or examples the students provide.

5. On page 3 of the preparatory packet, write down your predictions for the percent of high school males and the percent of high school females in a recent survey who agreed with each of the 12 statements. Then enter the actual percentages from the "RESULTS" sheet in Module 5. Write down your responses to the following questions:

   (a) Where were your predictions the furthest from the actual?

   (b) What have you learned about the attitudes of today's high school students that surprises you?

   Read over the entire module; you will be using this during the field trials.

6. Complete page 4 of the preparatory packet. Then read Module 6, and on page 5 of the preparatory packet classify each of the 20 statements as a, b, c, d, e or f depending on the major category in which it fits. You will be trying Module 6 in both a seminar and a class (or two classes if you cannot schedule a seminar).

7. Complete page 6 of the preparatory packet; then read Module 7. You will be trying Module 7 in a seminar if possible or a class if not.

8. Read Module 8. Be sure you are thoroughly familiar with these statistics. You will be trying this module out during the field trials.

9. Read over Module 9. You will be trying this out with a seminar (or class, if necessary).

10. Complete page 7 of the preparatory work packet, then read Module 10 and fill out page 8 of the preparatory packet for yourself.

Be sure to bring the completed preparatory work packet with you to the training session.

Also, please read the following materials:

1. Plans for the Large Group Presentation (blue)
2. A Proposal for the Development of a Visiting Women Scientists Program Designed to Motivate Women Students at the Secondary Level to Consider Careers in Science
3. Women in Science and Technology: Careers for Today and Tomorrow
4. I'm Madly in Love With Electricity

During the second week in January we would like you to visit the 2 schools, keeping a careful record of the activities you conduct in each class, the things that worked best, and suggestions for improving the activities.

The following class and seminar plans can be used as a general guideline. You may want to plan other combinations which you think will work better for you. Also you may not get to both activities in some classes if the students are particularly interested in the first one. Feel free to deviate as you wish, but be sure to try out each of the activities in at least one class or seminar even if it means scheduling visits to more classes in these schools or a third school.

You will also need to have a very brief introduction about the program to use in each class.

Tentative Plan for Visits

Class 1 - (a) Module 1 - Matching Exercise
(b) Module 4 - Scientists Work on Solving Societal Problems

Class 2 - (a) Module 5 - Male-Female Attitudes
(b) Module 10 - Skills and Interests for Science Careers

Class 3 - (a) Module 2 - Demonstration
(b) Module 8 - Importance of Science and Mathematics Prerequisites

Seminar 1 - (a) Module 7 - Role Conflict
(b) Module 3 - Profiles

Class 4 - (a) Module 4 - Scientists Work on Solving Societal Problems
(b) Module 10 - Skills and Interests for Science Careers

Class 5 - (a) Module 1 - Matching Exercise
(b) Module 2 - Demonstration

Class 6 - (a) Module 5 - Male-Female Attitudes
(b) Module 6 - Barriers

Seminar 2 - (a) Module 6 - Barriers
(b) Module 9 - Steps to Plan a Successful Career

We are enclosing multiple copies of the hand outs you will be giving to students as part of these modules:

Module 1 - 60 yellow "Examples of Science Careers"
60 green "Job Titles"

Module 5 - 60 gold "National Survey of High School Students, 1975"

Module 6 - 60 blue "Possible Barriers to Participation of Women in Traditionally Male Careers"

Module 7 - 30 buff "Case Study's"

Module 9 - 30 pink "What Steps Can you Take to Plan a Successful Career?"

Module 10 - 60 yellow "Science-Related Capabilities"

We have also enclosed 250 copies of the student questionnaire; allow at least 5 minutes at the end of each class session for students to complete the questionnaire. Have them put the date and time of the class or seminar on the sheet but not their names. Be sure you collect all of these. Also, you may want to collect the work sheets you hand out if it will help you determine the success of the class or seminar session. The questionnaires (and work sheets if you collect them) are for your use only. You need not bring them with you to the training session.

Finally, we have enclosed forms for you to use to keep a record of each class meeting (for seminars leave name of teacher blank and write "all-girl seminar" for type of class). Use the space at the bottom to jot down notes about how things are going during the visit--Is the class attentive? Too rowdy? What parts do they seem to enjoy most? etc. Bring these with you to the training session.

In summary, during the first two weeks of January you need to:

1. schedule visits to two schools;

2. complete the preparatory work packet and study the modules in preparation for the field trials; also read the other materials we've sent;

3. conduct the visits to the two schools;

4. make travel arrangements to come to the training session; and

5. bring the completed preparatory work packet, the materials for your demonstration, the modules, and the records of the visits with you to the training session. Also, be prepared to give an approximately 15 minute talk to the rest of us about your impressions of the field trials, what you learned from the student questionnaires, additional help and/or materials you would like RTI to provide, your suggestions for improving the program, etc.

We're looking forward to working with you.

Sincerely,

Dr. Iris Weiss
Project Director

Ms. Carol Place
Field Director

Enclosures

APPENDIX E

Letters to School Contact People, Film Brochure and Guide to Resource Packet

RESEARCH TRIANGLE INSTITUTE
POST OFFICE BOX 12194
RESEARCH TRIANGLE PARK, NORTH CAROLINA 27709

CENTER FOR EDUCATIONAL RESEARCH AND EVALUATION

[Name and Address of
Contact Person]

Dear [Contact Person]:

In the fall, your school expressed interest in participating in the National Science Foundation's Visiting Women Scientists Program. We have scheduled a visit to your school for [date of visit].

We would like to enlist your aid in arranging the program for that day. Ideally the visit will include the following:

1. A large group meeting of up to 150 10th grade female students.

2. Visits to several classes, preferably composed of different students from those who will attend the large group meeting.

3. One or more seminars, each with approximately 20 11th and 12th grade female students who are particularly suited for careers in science and mathematics. (These seminars could be scheduled for lunchtime or after school if that is more convenient.)

4. A meeting with guidance counselors, the school librarian, and at least one science teacher, one mathematics teacher, and one social science teacher. We are enclosing a resource packet of materials describing careers which will be explained at the meeting. If other district or school personnel are interested in career options for women, please invite them to attend as well.

5. A time to meet informally with interested female students.

Of course we realize that some of these activities will not be feasible in every school, and we intend to work with you in planning a visit that is appropriate for your school.

As part of the program, you will receive "The Women's Prejudice Film," an 18-minute color film, approximately one week prior to the visit. It is important that you arrange to have the film shown to the students who will be participating in the Visiting Women Scientists Program within a few days before the visit. (You may keep the film until the day of the visit and show it to other students in the school as well if you wish.) We are enclosing multiple copies of a brochure which should be distributed to students immediately after they see the film.

(919) 541-6000 FROM RALEIGH, DURHAM AND CHAPEL HILL

We are also enclosing several announcements of the program for you to post. Note that there is a space for you to insert the agreed upon date of the visit and space at the bottom for you to add your own comments. For example, if the visit in your school will include a seminar for females particularly interested in science and mathematics you might want to announce that and ask interested students to contact you. Also, if there will be a time when students will be able to drop by to chat with the women scientists you can announce the time and place.

Ms. Jean Gray, one of the two women scientists who will be conducting the visit to your school, will be in touch with you shortly to work out the details of the visit. If you have any questions please feel free to contact Ms. Carol Place (collect 919-541-6319).

Sincerely,

Iris Weiss

Iris Weiss
Project Director

Carol Place

Carol Place
Field Director

CP/sjs
Enclosures

RESEARCH TRIANGLE INSTITUTE
POST OFFICE BOX 12194
RESEARCH TRIANGLE PARK, NORTH CAROLINA 27709

CENTER FOR EDUCATIONAL RESEARCH AND EVALUATION

R T I

Dear

In the fall, your school expressed interest in participating in the National Science Foundation's Visiting Women Scientists Program and your name was given to us as the person to contact. As we indicated earlier, 1978 is a pilot year for the program and it will be possible to visit only 120 schools throughout the country. We randomly selected a group of schools to be visited and another group of schools to receive science career information from all of those schools which expressed interest. Your school was selected to receive a set of materials.

I am sending in a separate package a "Resource Packet" which contains information about career planning in general as well as information specific to careers in science, mathematics, engineering and social science. We suggest that this packet be located in the guidance office in a place that is accessible to students. Please be sure that your librarian, administrators, and science, mathematics and social science teachers are aware of these materials so they can use them and tell students about them.

I am also sending multiple copies of a postage-paid postcard for students to use in requesting additional information. In order for us to evaluate the utility of this device, we ask that you distribute one postcard to each 10th grade female student in your school. If you do not have enough postcards for each 10th grade female, please call Ms. Carol Place (collect--919-541-6319). If Ms. Place is unavailable, leave a message about the number of postcards you need, your name, and your school's name and we will see that you get the postcards.

We sincerely regret that it will not be possible to have a woman scientist visit your school this year, but hope that the Resource Packet and materials we send to 10th grade females at their request will help accomplish some of the objectives of the visit. We appreciate your interest in this program.

Sincerely,

Iris R. Weiss

Dr. Iris R. Weiss
Project Director
Visiting Women Scientists Program

IRW:cr
Enclosures

(919) 541-6300 FROM RALEIGH, DURHAM AND CHAPEL

HELP WANTED

BIOLOGIST/CHEMIST

Ph.D. in biological or chemical discipline with 1-2 yrs. previous supervisory experience. Administer to an organization of 50 permanent scientists & technicians who work in such diverse areas as Asbestos research, inhalation toxicology, tissue culture and cytotoxicity, mutagenesis, pesticide chemistry, carcinogen metabolism and analytical biochemistry. Coordinate activities of personnel & assure that scientists receive all necessary resources to complete the scope of work, prepare budgets and performance reviews, prepare monthly progress reports, provide communication liaison between upper management and technical personnel. Will initiate and provide coordination for program expansion and development in health related fields.

SOFTWARE SUPERVISOR ENGINEERS

If you enjoy working in a group of highly professional and motivated
the opportuni
enhancements
timesharing sy

If you have
language prog
be the chance
skills in a cha
Computer Scie

COMP

Excellent opp
Specialists wi
below:

COMPUTER SYSTEMS DESIGNER
- Design and specification distributed computer systems
- Hardware and operating system selection
- Comparative evaluation of alternate system architectures
- Large system and network load analysis

DATA BASE SPECIALIST
- Data base requirements definition and design
- Implementation of data base such as ADABAS, IDMS, DRS
- Performance tradeoff analysis involving storage media, distributed data design, network design

DBM SYSTEMS LIAISON SPECIALIST
- Familiarity with programming and data base terminology
- Experience with technical reports on intelligence or multi-vendor computer systems
- Experience with vendor technical library requirements

PROGRAMMER

Real-time World-wide Earthquake & Underground Explosion Detection System in Support of Comprehensive Test Ban Treaty Research. System includes DEC & IBM hardware. Opportunities in interactive graphics network processing system improvement, & creation & management of a large seismic data-base. Math, Science or Computer Science degree required.

SYSTEMS ANALYST/ PROGRAMMER

Join our staff of R&D Engineers & Scientists, refining existing math models & engineering management information systems. Prefer applied mathematics background with experience in cost analysis. Require FORTRAN IV experience, & prefer prior experience with CDC 6000. Salary open.

HELP WANTED

ECONOMIST

Large trade association is seeking research-oriented economist with minimum 1 to 3 years experience in banking and/or financial data analysis.

Successful candidate will have degree(s) in Economics or related fields and possess good verbal and writing skills. Should have ability to communicate well with non-economists. Familiarity with consumer credit or housing policy issues would be helpful.

Starting salary commensurate with experience.

ELECTRICAL/ELECTRONIC & MECHANICAL ENGINEERS

—To design, develop, and checkout specialized semi-automatic and automatic electronic and/or mechanical test equipment. Positions also involve troubleshooting engineering problems on the produc-
include laser
mputers, and
dination with
and quality
signments. BS
or Mechanical

mmed. open-
e in hydrology
. Positions will
mplete fringe
ting salaries

ENGINEERS

AIR POLLUTION

Positions avail. in air pollution measurement & instrumentation technology for entry level engineers & exper. air pollution engineers. BS or MS degrees in chem., mech. or envir. engineering desired. Strong technical writing & speaking skills required.

ENGINEERS

MECHANICAL — METALLURGICAL
ELECTRICAL — CHEMICAL

Development and expansion of our state-of-the-art radiological waste handling systems has created opportunities for experienced engineers. Our position of leadership in radiological waste handling development provides outstanding growth and development in the areas of:

Chemical process control systems design; fluid andgas process system equipment specification development; design and selection of chemical, slurry and solid processing, air scrubbing and remote handling systems; and material considerations for high temperature applications.

Engineers with experience in these areas who desire immediate challenge and opportunity to demonstrate professional ability are invited to submit their resumes.

CIVIL ENGINEER
Position in County Gov't.

Acts as a project engineer for capital projects such as roads and storm drainage; reviews subdivision and water and sewer plans for conformance with codes and standards and prepares technical reports and evaluation. Position requires a bachelor's degree in civil engineering and two years of engineering experience.

CAREERS IN SCIENCE AND TECHNOLOGY:
MORE WOMEN NEEDED

An Increasing Number Of Women Have Jobs Outside Their Homes

The Women's Bureau of the Department of Labor reports that 9 out of 10 women will work at some time in their lives. And it is not just single women, widows and divorcees who are working. The majority of working women are married women living with their husbands and families. Even with a break in employment for marriage and children, the average woman worker can expect to work for 25 years; many work up to 45 years.

Some Fields, Including Those In Science and Technology, Have A Scarcity of Women

Employers are actively seeking qualified women for positions in science and technology, but there is a scarcity of women trained for many of these jobs. While women represent about 40 percent of all persons in professional and technical occupations, relatively few of these women are in the science labor force. Traditionally, most women who have entered professional careers have chosen fields such as teaching, nursing, and social work.

More Women Are Entering Traditionally Male Fields

In recent years, an increasing number of women have been employed in occupations which were once considered the exclusive domain of males. For example, in the 6 years from 1968 to 1974 the proportion of women in the science labor force increased from 8 percent to 14 percent, and it seems that more women than ever are planning to enter traditionally male careers. For example, while only 7 percent of American physicians are women, 17 percent of the physicians in training are women.

Recent Federal Laws Prohibit Discrimination Against Women In Education And Employment

It is now illegal for an organization to discriminate on the basis of sex in salaries, fringe benefits, promotions, sick leave, or any other conditions of employment. Many schools and companies now have affirmative action plans and are actively recruiting women in order to comply with federal regulations.

There Are Many Opportunities For Women In The Sciences

Scientists are employed in industry, government, universities, research laboratories, consulting firms, etc. Many employers are seeking women

trained in the various science fields (including Mathematics, Engineering, Biological Sciences, Physical Sciences, and Social Sciences). In general, opportunities for persons trained in the sciences are much better in industry than academia. Also, fields which already have a considerable number of women are generally less eager than others to train and employ additional women.

Engineering is a particularly promising field for women. Activities of engineers include developing scientific equipment, designing and supervising construction, and, in general, planning and implementing technical solutions to modern day problems. Women are needed in all types of engineering--aerospace, agricultural, chemical, civil, electrical, industrial, mechanical, metallurgical, mining, and others. Many engineering jobs are available to persons with a bachelor's degree, and salaries are excellent. Currently, less than 1 percent of all engineers are women, and employers are actively seeking more. According to Daniel Drucker, Dean of the College of Engineering at the University of Illinois, "Large corporations and small are just about knocking each other down in their eagerness to find qualified women engineers."

You Do Not Have To Be A Genius To Succeed In A Career In Science and Technology

If you are curious about why and how events occur; if you like to see how things work; if you like challenges and take pride in performing tasks well, you might want to consider a career in one of the many science-related fields. As one scientist said, "Gender doesn't matter. A scientist or technologist can be 100% feminine and do the job well."

It Is Important To Get A Good Background In Mathematics And Science In High School

While you may already have a pretty good idea of your interest and abilities, you probably do not know enough about the various career alternatives to decide that you want to be a civil engineer, a cultural anthropologist, a computer systems analyst, or a biophysicist, to name just a few. Keep your options open by getting a good background in mathematics and science, especially mathematics, while you are in high school, even if you do not think you will want to pursue a science-related career. Don't limit yourself later by failing to get adequate high school mathematics and science preparation.

CAREERS FOR WOMEN IN SCIENCE, MATHEMATICS, ENGINEERING AND SOCIAL SCIENCE

GUIDE TO COUNSELOR'S RESOURCE PACKET

This resource packet, to be used by students and teachers as well as guidance counselors, introduces the reader to the possibilities and opportunities available in a wide variety of areas of science.

Included in the packet are:

a) pamphlets describing careers in general and careers within specific areas of science. They are published by a number of sources including specific professional science organizations, industries, and the federal government. Careers outlined include those in engineering, mathematics, statistics, physics, chemistry, meteorology, microbiology, geography, etc. Such topics as employment opportunities, education requirements, suggested schools, financial aid information and salaries are explored in the pamphlets.

b) information about financial aid; and

c) an annotated bibliography of other especially good career publications and films, along with information on where to obtain them and their cost.

RESOURCE PACKET FOR GUIDANCE COUNSELORS

A. CAREER OPPORTUNITIES IN VARIOUS AREAS

1. GENERAL

a. GENERAL ELECTRIC - Planning Your Career
b. CATALYST - Planning for Career Options
c. AMERICAN COLLEGE TESTING PROGRAM - Women in Science and Technology
d. KREINBERG - I'm Madly in Love With Electricity
e. U.S. DEPT. OF LABOR, BUREAU OF LABOR STATISTICS - Science and Your Career

2. ENGINEERING

a. GENERAL ELECTRIC - What's it Like to be an Engineer?
b. ENGINEERS COUNCIL FOR PROFESSIONAL DEVELOPMENT - Womengineer
c. NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS - Engineering--A Career of Dedication & Responsibility
d. ENGINEERS COUNCIL FOR PROFESSIONAL DEVELOPMENT - Several short pamphlets describing areas of engineering such as civil engineering, mechanical engineering, automotive engineering, etc.
e. AMERICAN INSTITUTE OF MINING, METALLURGICAL AND PETROLEUM ENGINEERS - A Career in Metallurgy, Metallurgical Engineering,...
f. KODAK - Women in Engineering at Kodak

3. PHYSICAL SCIENCES

a. AMERICAN PHYSICAL SOCIETY - Women in Physics
b. AMERICAN CHEMICAL SOCIETY - Careers in Chemistry Today
c. AMERICAN CHEMICAL SOCIETY - Careers Nontraditional
d. AMERICAN CHEMICAL SOCIETY - Careers in Chemistry Questions and Answers
e. MANUFACTURING CHEMISTS ASSOCIATION - Your Tomorrow-A Guide to Careers in the Chemical Industry
f. AMERICAN METEOROLOGICAL SOCIETY - The Challenge of Meteorology
g. HARVARD CENTER FOR ASTROPHYSICS - Space for Women
h. AMERICAN ASTRONOMICAL SOCIETY - A Career in Astronomy

4. BIOLOGICAL SCIENCES

a. AMERICAN INSTITUTE OF BIOLOGICAL SCIENCES - Careers in Biology
b. AMERICAN SOCIETY OF MICROBIOLOGISTS - Microbiology in Your Future
c. U.S. DEPT. OF LABOR, BUREAU OF LABOR STATISTICS - Ecology and Your Career
d. U.S. DEPT. OF LABOR, BUREAU OF LABOR STATISTICS - The Outdoors and Your Career

5. MATHEMATICS

a. U.S. DEPT. OF LABOR, BUREAU OF LABOR STATISTICS - Math and Your Career
b. MATHEMATICAL ASSOCIATION OF AMERICA - The Math in High School... You'll need for college
c. MATHEMATICAL ASSOCIATION OF AMERICA - Professional Opportunities in Mathematics
d. AMERICAN STATISTICAL ASSOCIATION - Careers in Statistics

6. SOCIAL SCIENCE

   a. U.S. DEPT. OF LABOR, BUREAU OF LABOR STATISTICS - Social Science and Your Career
   b. ASSOCIATION OF AMERICAN GEOGRAPHERS - Careers in Geography
   c. AMERICAN POLITICAL SCIENCE ASSOCIATION - Careers and the Study of Political Science (Curzan)

B. FINANCIAL AID

1. NATIONAL ACADEMY OF SCIENCE - A selected list of major fellowship opportunities and aids ....

2. U.S. DEPT. OF HEALTH EDUCATION AND WELFARE - Look Out for Yourself

3. AMERICAN CHEMICAL SOCIETY - Financial aid for College Students

C. ANNOTATED BIBLIOGRAPHY

1. CAREER PUBLICATIONS

   a. CAREERS FOR WOMEN IN THE 70's, 1973 Women's Bureau, Department of Labor, U.S. Government Printing Office, Washington, DC 20402 ($.50) -

      Expected numbers of openings in particular fields are presented as well as the employment picture for women. The suggestion is made that women's careers should not be any different from men's.

   b. U.S. WORKING WOMEN-A CHARTBOOK, 1975 U.S. Department of Labor, Bureau of Labor Statistics, U.S. Government Printing Office, Washington, DC 20402 ($1.75) -

      Through charts and graphs, a wide range of data are presented on the characteristics of American working women and their changing status over the last quarter of a century.

   c. SUPPLY AND DEMAND FOR SCIENTISTS AND ENGINEERS, 1977 (Vetter), Scientific Manpower Commission, Washington, DC 20036 ($1.50) -

      An excellent review of studies including projections of the supply and demand for scientists and engineers.

   d. WOMEN AND MINORITIES IN SCIENCE AND ENGINEERING, 1977, National Science Foundation, U.S. Government Printing Office, Washington, DC 20402 ($.75) -

      Analytical report developed from existing statistical data to illuminate the role of women and minorities in science and engineering.

   e. FEDERAL CAREER DIRECTORY, 1976-77 U.S. Civil Service Commission, U.S. Government Printing Office, Washington, DC 20402 ($3.45) -

      Describes federal careers, employers and job briefs.

f. OCCUPATIONAL OUTLOOK HANDBOOK, 1976-77 U.S. Department of Labor, Bureau of Labor Statistics, U.S. Government Printing Office, Washington, DC 20402 ($7.00) -

General reference book providing descriptions of about 850 occupations including: the nature of the work, places of employment, qualifications needed, earnings and working conditions, sources of additional information.

g. I CAN BE ANYTHING--CAREERS AND COLLEGES FOR YOUNG WOMEN, 1975 (Mitchell) College Entrance Examination Board, Princeton, NJ 08540 ($4.50 paperback, $6.50 hardcover) -

Describes careers for young women--and certainly all careers are for women. Goes beyond a description of career information and introduces the critical consideration for girls and women: the consideration of a life style.

h. WHAT CAN I BE? A Guide to 525 Liberal Arts and Business Careers (Leo Lieberman, $6.75), Martin M. Bruce, Ph.D. Publishers, Box 228, New Rochelle, NY 10804

Presents the required and desirable academic majors, abilities and educational degrees for students who know the career they want; provides suggested majors and careers based on school subjects enjoyed in the past, for students who have not yet decided on a career or occupation.

i. CAREER OPPORTUNITIES BOXES, 1975, Time Share, Houghton Mifflin, West Hartford, CT 06110 ($48.00 each) -

Job information associated with major disciplines. Occupations covered include a wide range of skill levels and educational requirements.

j. NEW CAREER OPTIONS FOR WOMEN--A COUNSELOR'S SOURCEBOOK, 1977 ($16.95). Human Sciences Press, New York, NY 10011 (Set of 3 publications approximately $26.00); NEW CAREER OPTIONS--A WOMAN'S GUIDE, 1977 ($4.95); NEW CAREER OPTIONS FOR WOMEN--A SELECTED ANNOTATED BIBLIOGRAPHY, 1977 ($9.95) -

Excellent set of source books dealing with careers for women. Reviews employment opportunities, legislation, practical advice regarding family and work, and suggestions for career and educational planning.

k. SCIENCE AND ENGINEERING CAREERS: A BIBLIOGRAPHY, 1974 Scientific Manpower Commission, Washington, DC 20036 (single copy $2.00, 25+ $1.00 ea.) -

Comprehensive bibliography of career guidance information in science and engineering, with complete source address, cost, etc. Also a section about financial aid.

l. KEYS TO CAREERS IN SCIENCE AND TECHNOLOGY, 1973 National Science Teachers Association, 1973, Washington, DC 20036 ($1.00)

Comprehensive bibliography of career guidance publications and information on scholarships and loans, special programs for students and teachers, awards, and agencies.

m. ENGINEERING AS A PROFESSION FOR WOMEN, 1976 Engineering Manpower Bulletin #29, Engineering Manpower Commission, New York, NY 10017 ($2.00) -

Discusses misconceptions, current employment picture, barriers, and problems faced by women in engineering, and also talks about why engineering needs women.

n. WOMEN AND SUCCESS - THE ANATOMY OF ACHIEVEMENT (Kundsin, ed.) -

Profiles of women in careers in crystallography, mathematics, electrical engineering, physics, meteorology, chemistry, etc.

o. TEST YOURSELF FOR SCIENCE, 1971 Scientific Manpower Commission, Washington, DC 20036 (single copy $1.00; 25+ $.50 each) -

For students, this booklet contains puzzles and problems to think about and try to solve; also included is a section which suggests how to get more information about careers in science.

p. WHEN I GROW UP I'M GOING TO BE MARRIED, Commission on the Status of Women, Sacramento, CA 95884 -

A game which illustrates how time and circumstance affect women.

2. FINANCIAL AID

a. EDUCATIONAL FINANCIAL AIDS, 1976, American Association of University Women, Washington, DC 20037 ($1.00)

b. CATALOG OF FEDERAL EDUCATION ASSISTANCE PROGRAMS, 1976, U. S. Government Printing Office, Washington, DC 20402 ($7.30)

c. FEDERAL AND STATE STUDENT AID PROGRAMS, 1972, U. S. Government Printing Office, Washington, DC 20402 ($1.10)

d. FINANCING POSTSECONDARY EDUCATION IN THE UNITED STATES, 1974, U. S. Government Printing Office, Washington, DC 20402 ($4.00)

e. GUARANTEED STUDENT LOAN PROGRAM, 1976, U. S. Government Printing Office, Washington, DC 20402 ($3.40)

3. FILMS

a. "Keep the Door Open...," - (18 minutes, color).
Review copy sent upon request.

Sandia Laboratories
Box 5800
Albuquerque, NM 87115

An excellent discussion by 13 professional women of the problems involved in combining careers with marriage and a family, stereotypes and obstacles to be overcome, along with the joys experienced in a career. Women portrayed represent such areas as chemistry, law, zoology, engineering, math and biology.

b. "The Women's Prejudice Film" - ($255.00 - 18 minutes, color). Review copy sent upon request.

Sandler Institutional Films, Inc.
1001 N. Poinsettia Place
Hollywood, CA 90046

Specific prejudices and stereotypes are voiced by both men and women. Included are short profiles of women in traditionally male careers. The film states that women must overcome their own self doubts and worries as well as wade through male chauvinism.

c. "Women's Work: Engineering" - ($295.00 purchase or $30.00 5-day rental, 26 minutes, 16mm film or color videotape) -

MIT
Center for Advanced Engineering Study
77 Massachusetts Avenue
Cambridge, MA 02139

Explores the experience of being an engineer and a woman -- through the professional and personal lives of students and working engineers.

APPENDIX F

Letter and Modules Sent to Visiting Women Scientists

RESEARCH TRIANGLE INSTITUTE
POST OFFICE BOX 12194
RESEARCH TRIANGLE PARK, NORTH CAROLINA 27709

CENTER FOR EDUCATIONAL RESEARCH AND EVALUATION

[Date]

[Woman Scientist's
Name and Address]

Dear [Woman Scientist]:

We are delighted that you will be participating in the National Science Foundation's Visiting Women Scientists Program. The program is designed to encourage high school females to consider careers in science and technology. (Please note that NSF defines science to include mathematics, engineering, social science, biological science, and physical science.) The objectives established for the program are as follows:

1. To provide an opportunity for high school students to meet and interact with women scientist role models.

2. To provide examples of women in a variety of science careers.

3. To provide evidence of women who have combined family lives and successful careers in a variety of ways.

4. To provide information about the importance of science and scientists in solving world problems.

5. To provide information about science and technology job opportunities for women in the future (including emerging careers), and equal opportunity laws and affirmative action programs which guarantee women access to these opportunities.

6. To provide information about the preparation needed for various science careers, the importance of keeping various options open, and the sources of financial aid which are available for obtaining this preparation.

7. To encourage teachers and counselors to provide support and encouragement to women who are considering science careers.

8. To promote the attitude among both males and females that virtually all careers, including those in science and technology, are appropriate for women as well as men.

9. To encourage high school females to seek additional information about women in science careers, and to provide assistance in obtaining such information.

(919) 541-6000 FROM RALEIGH, DURHAM AND CHAPEL HILL

To accomplish these objectives, you and an RTI Field Representative will be meeting with students, teachers, counselors, and librarians in each school. Each one-day visit will consist of some combination of the following meetings:

1. a large group presentation to as many as 150 tenth grade female students;

2. meetings with one or more science, mathematics and social science classes;

3. one or more seminars, each consisting of 20-30 female students who have particular interest in science and mathematics; and

4. a meeting with counselors, librarians, and at least one representative of the science department, the mathematics department, and the social science department.

Each school has also been asked to set aside a time and place for individual students to drop by and chat with you on an informal basis.

Several days before the visit students will be shown "The Women's Prejudice Film" which explores myths and realities about working women. The film stimulates the viewer to reappraise his or her current attitude concerning the equality of roles among women and men, and points out that women themselves need to explore the world of work more fully. To complement the film, students will be given a brochure which talks about opportunities in science and technology.

On the day of the visit each student will be given a postcard to request additional information, and a questionnaire to evaluate the utility of the program. Finally, a Resource Packet containing pamphlets about careers in science and technology will be given to each school.

You are scheduled to visit the following schools during the week of [date(s) of visit]:

[School(s) Name]

The RTI Field Representative in your region, [Field Rep's name], will have been in touch with the schools to plan the agenda for each visit. She will contact you soon to discuss travel arrangements and plans for the visits.

To help you prepare for the visits, we are enclosing several materials:

1. The brochure, "Careers in Science and Technology: More Women Needed" which is being distributed to students at the time they see "The Women's Prejudice Film."
2. The pamphlet Women in Science and Technology which deals with many of the topics important to this program. Students who return the postcard requesting additional information will be sent a copy of this pamphlet. In addition, a copy is included in the Resource Packet which will be given to the school.
3. The pamphlet I'm Madly in Love with Electricity which is also included in the Resource Packet, and which I am sure you are quite familiar.
4. A booklet of 10 modules which was developed for the Visiting Women Scientists Program. These modules describe activities which can be used during the visit to accomplish various objectives of the program.
5. A Guide to Counselor's Resource Packet (blue) and the "Outline of the Counselor Meeting."

Your specific responsibilities in the program are described in Module 1. The Field Representative is prepared to lead the remaining 9 modules as well as the Counselor Meeting. However, we hope you will take the time to become familiar with all of the materials so you will be able to participate in as many of the activities as possible. For example, Module 3 presents profiles of the careers and lives of a number of women scientists. You undoubtedly know of other examples which you could mention at appropriate times during the visit.

As described in Module 1, you should prepare approximately one hour's worth of remarks about your career and your life. While you will probably spend no more than 15 or 20 minutes speaking to any one group of students we want you to have enough prepared so that you can vary your presentations by selecting one or two topics for discussion in each meeting. If you kept repeating the same remarks to several groups in each school it is inevitable that you would begin to lose some of your sparkle.

We hope that you are enthusiastic about your work and that you will be able to communicate your enthusiasm to the students. However, please be careful not to appear to be recruiting for your particular field or employer. Similarly, do not give students the impression that you advocate any one life style (such as not working while your children are very young, having a full-time housekeeper, or having both the husband and wife employed half-time); the point of the program is that a diversity of life styles can be combined with careers in science and technology.

It is possible that some students will interpret this program as "Women's Lib" or "pro-ERA," Please avoid letting them draw you into a debate about these issues, regardless of your personal beliefs. Also, please be careful not to depict yourself or other women scientists as "superwomen." Students will find it hard to identify with a woman who is an award-winning scientist and at the same time sews all of the clothes her family wears and cooks candlelit dinners for 20 people on a weekly basis. They might easily become discouraged from pursuing a science career because such feats are clearly beyond them.

In summary, we would like you to keep things in perspective-science careers can be exciting and rewarding, and these careers can be combined with complete and satisfying home lives, but there will be problems that will need to be worked out.

Now for a few housekeeping matters:

(1) Please bill us for a total of _____ consulting days (at $100/day) so we can reimburse you for your preparation time as well as the time you spend visiting the schools.

(2) Submit receipts for hotels and car rentals; also submit any plane tickets. You need not get receipts for meals, tips, taxis, etc.

(3) Reimbursement for travel in your own car is at a rate of $.16/mile.

(4) We are enclosing a "Record of Visit" form and a postage-paid envelope. Please return your invoice and the completed Record of Visit Form to us in this envelope.

We appreciate your willingness to serve as a role model for high school females and hope the experiences of the Visiting Women Scientists Program will be rewarding both to you and to the students.

If you have any questions about the program, please contact [Field Rep's name and phone number]. If you have difficulty in reaching her, or if you have any questions or concerns you wish to discuss with the RTI central staff, please call Ms. Carol Place (collect 919-541-6324).

Sincerely,

Iris Weiss
Project Director
Visiting Women Scientists Program

Carol Place
Field Director

Enclosures
IRW:CP:cr

Center for Educational Research and Evaluation

MODULES

FOR THE

NATIONAL SCIENCE FOUNDATION

VISITING WOMEN SCIENTISTS PROGRAM

1978

LIST OF MODULES

MODULE 1: Woman Scientist Describes Aspects of Her Career and Her Life

MODULE 2: Definitions of Types of Science

MODULE 3: Profiles of Women Scientists

MODULE 4: Scientists Work on Solving Societal Problems

MODULE 5: Attitudes Toward Careers for Women -- Male/Female Differences

MODULE 6: Barriers to Participation of Women in Science Careers

MODULE 7: Role Conflict

MODULE 8: Importance of Science and Mathematics Prerequisites

MODULE 9: Steps to Plan a Successful Career

MODULE 10: Skills and Interests for Science Careers

Classroom/Seminar Module #1

Woman Scientist Describes Aspects of Her Career and Her life

I. INTRODUCTION

Research has shown that the absence of suitable role models is one of the major barriers to the participation of women in traditionally male fields such as science and technology. One of the most important objectives of the Visiting Women Scientists Program is to provide an opportunity for high school females to meet and interact with women scientist role models.

This module will be the responsibility of the woman scientist. You will need to be prepared to talk about various aspects of your career and your life and to demonstrate some job-related activity. These are discussed in more detail below.

II. DISCUSSION OF CAREER AND LIFE

You should prepare remarks about a variety of aspects of your career and your life. If you have pictures or slides which illustrate some of your experiences, you may want to show them.

Among the topics you might discuss are:

(1) Your career development -- when you decided upon a science career, who influenced you, who tried to dissuade you, your education, jobs you've held, problems you've encountered and how you've solved them.

(2) Your current job activities and responsibilities.

(3) Issues related to being a woman in a man's world.

(4) How you've combined your career with other pursuits. If you're married, how does your husband feel about your career? How do you and your husband divide up housekeeping responsibilities? Have you had to decide what to do if one of you gets a good opportunity clear across the country? If you have children, how much time did you take off? Did you work part-time for a while? How did you manage child-care responsibilities?

Be prepared with at least one hour's worth of material. This is much more than you would possibly discuss in a single class meeting, but you will then be able to select a few topics for each meeting and to modify your presentation to fit the needs of the particular audience. Your remarks should be presented conversationally, should generally include some anecdotal information, and should include some humor with which the students can relate.

(a) Large group presentation

The size of this meeting (up to 150 female students) necessitates a fairly formal presentation about your career and your life. If you bring slides, this would be a good time to use them.

(b) All-female seminars

Previous experiences in having high school females interact with women scientist role models showed that the students are more interested in issues of life style (e.g., combining career and home life) than they are in finding out about a particular career. Also, they feel more comfortable asking questions and expressing their own fears and aspirations in all-female groups. Therefore, if you have the opportunity to meet with one of these seminar groups, it would be an ideal time to talk about how you've combined your career with other pursuits. Students should be given the opportunity to express their opinions and to ask questions.

(c) Class meetings

When you meet with a group which includes males and females you might focus on your career development and merely mention your current job activities. In a second class you might spend considerable time talking about your current job, and possibly demonstrate some aspect of your work.

Some examples of experiences which women scientists might include are the following:

A. An anthropologist may have traveled to four foreign countries over a period of eight years while raising children of school age. Maybe her family traveled with her as she arranged for summer travel. (Some pictures might be passed around or shown

as slides.) Or maybe her husband kept the family for those long periods of time. Perhaps she almost rejected the first opportunity because she thought it could not be worked out, but her husband and older children insisted she not give up the opportunity to participate in such projects. There must have been some problems which had to be dealt with collectively.

B. A successful woman scientist may have started in a clerical position and was offered an opportunity to advance because of her good work. Maybe she had to attend school and special classes for several years to make up for a lack of training in basic science and mathematics because as a high school girl she never dreamed she would need these courses.

C. A biologist may have been a member of a team that made an important discovery leading to the development of a vaccine to prevent a commonly known illness. The obvious importance of this contribution will lend credibility to women in science.

III. DEMONSTRATION OF A JOB-RELATED ACTIVITY

Prepare a demonstration of some aspect of your work. The demonstration should be approximately 15 minutes in length; it should be something of interest to high school students and at a level they can understand. Plan to use only materials which you can bring with you to the school, and make sure all students in the room will be able to see what you are doing. If possible, choose something which will actively involve the students in actual hands-on activities, predicting results, etc.

Examples of demonstrations include:

A. An archaeologist might bring some fossils, describe what they are, and tell where they were found. She might explain the problems of traveling to sites and working there, and she might show some pictures of the process.

B. A woman scientist involved in some aspect of computer technology might bring a portable terminal, write a program, and race the students in computations. She might then present the parameters of some complex problems and explain how the computer has made work of this sort possible. This person might be able to indicate the number of newly created jobs which have been generated by computers in the last year at her work site.

Classroom/Seminar Module #2
Definitions of Types of Science

I. INTRODUCTION

Early field trials of the Visiting Women Scientists Program showed that many high school students are unfamiliar with career opportunties in science and technology. For example, very few students know what an engineer actually does and even fewer are familiar with categories within engineering such as civil or mechanical engineering. The purpose of this module is to help students become aware of the diversity of careers within science and technology. Two forms of the activity are presented below; the second is preferable if a large group meeting will be held in that school since many students will see the slides at that time. Several pages of background information are provided for your use.

II. ACTIVITY WITH PICTURES

1. Ask the students to number from 1 to 15 both down the left (A) and down the middle (B) of the page.
2. Hold up a picture of a woman scientist at work, give a short description of her job activities, and ask the students to write down the name of her job in column A. They should feel free to guess or they can leave it blank if they have no idea at all. Then give the options and ask them to write their choice in Column B. Ask for a volunteer to tell you what he/she wrote in A and B; then tell them the correct answer, and tell them a little more about the job and how it differs from the other options. Give information about employment projections at this time.
3. Continue in this mode until you have shown all of the pictures.

III. MATCHING EXERCISE

1. Hand out the "EXAMPLES OF SCIENCE CAREERS" and the "JOB TITLES" and ask students to complete the matching exercise.
2. Lead a brief discussion about employment projections, and answer any questions they have about particular jobs. Some general points to make during a discussion are:
   a. Engineering is a wide open field, especially for women, and one where you can get interesting, high salary jobs with a bachelor's degree.
   b. In general, there will be greater opportunities in business and industry and in government than in university teaching. The picture in universities is better for women than for men, but still not that great.
   c. A few science fields, especially in the social sciences, already have a large proportion of women. Find out about the percent of women in the various fields you may be interested in, and other things being equal, head toward ones which now have relatively few women. Again, engineering is outstanding in its potential for women. (you can read them a few examples of the percent of women in various science fields.)

BACKGROUND INFORMATION

BIOLOGICAL SCIENCE

ANATOMY	-	deals with the structure of organisms.
BACTERIOLOGY	-	deals with bacteria and their relations to medicine, industry, and agriculture.
BIOCHEMISTRY	-	deals with the chemical compounds and processes occuring in organisms.
BIOLOGY	-	deals with living organisms and vital processes.
BIOPHYSICS	-	concerned with the application of physical principles and methods to biological problems.
BOTANY	-	deals with plant life.
ECOLOGY	-	study of the relationship between organisms and their environment.
ENTOMOLOGY	-	deals with insects.
FORESTRY	-	The science of developing, caring for, or cultivating forests.
GENETICS	-	deals with the heredity and variations of organisms.
IMMUNOLOGY	-	deals with the phenomena and causes of immunity.
LIFE SCIENCE	-	deals with living organisms and life processes.
MICROBIOLOGY	-	deals with microscopic forms of life.
PHYSIOLOGY	-	deals with the functions and activities of life or of living matter and of the physical and chemical phenomena involved.
ZOOLOGY	-	deals with animals and is concerned with the animal kingdom and its members as individuals and classes.

PHYSICAL SCIENCE

ASTRONOMY	-	The science of the celestial bodies and of their magnitude, motion and constitution. Astronomers seek answers to questions about the fundamental nature of the universe such as its origin and history, and the evolution of our solar system.
CHEMISTRY	-	deals with the composition, structure and properties of substances and of the transformations they undergo. Chemists search for and put into practical use new knowledge about substances.
GEOLOGY	-	deals with the history of the earth and its life, especially as recorded in rocks. Geologists study the structure, composition and history of the earth's crust.
GEOGRAPHY	-	deals with the earth and its life.
GEOPHYSICISTS	-	study the composition and physical aspects of the earth and its electric, magnetic and gravitational fields.

METEOROLOGY - Meteologists describe and try to understand the atmosphere's physical composition, motions and processes, and determine the way these elements affect the rest of our physical environment.

OCEANOGRAPHY - deals with the oceans and includes the delimitation of their extent and depth, the physics and chemistry of their waters, biology and the exploitation of their resources.

PHYSICS - Through systematic observation and experimentation, physicists describe in mathematical terms the structure of the universe and interaction of matter and energy; they develop theories that describe the fundamental forces and laws of nature.

MATHEMATICAL SCIENCE

COMPUTER SCIENCE - involves the outlining of steps a computer must take to solve a problem using the language developed especially for computers, and the planning of efficient methods of processing data and handling the results.

STATISTICS - deals with the collection, analysis, interpretation and presentation of masses of numerical data.

SOCIAL SCIENCE

ANTHROPOLOGY - The science of man; the study of man in relation to distribution, origin, classification and relationship of races, physical character, environmental and social relations, and culture.

ECONOMICS - concerned chiefly with description and analysis of the production, distribution, and consumption of goods and services.

POLITICAL SCIENCE - concerned chiefly with the description and analysis of political and especially governmental institutions and processes.

PSYCHOLOGY - The science of mind and behavior.

SOCIOLOGY - The science of society, social institutions and social relationships.

ENGINEERING

AERONAUTICAL AND ASTRONAUTICAL - Works on the design and development of aircraft and space craft.

AGRICULTURAL - Involved with every phase of agriculture from production of plants and animals to the final processing of food, feed and fiber products.

AUTOMOTIVE - Deals with every aspect of research design, testing and manufacturing of not only automobiles but every type of self-propelled vehicle.

CERAMIC - Works on the design and manufacture of products made from non-metallic minerals and rocks.

CHEMICAL - Applies chemical, physical and engineering principals to manufacturing processes in which materials undergo chemical change.

CIVIL - Involved in relating to the needs of the city or community; field encompasses building of roads and bridges as well as complex societal problems such as water and air quality and transportation systems.

ELECTRICAL AND ELECTRONIC - Concentration on making electrical energy available and utilizing it properly.

INDUSTRIAL - Analyzes the personnel, materials and equipment involved in a manufacturing process and then organize their interaction for greatest efficiency.

MANUFACTURING - Solves problems, organizes projects and does research; seeks better ways of producing products.

MECHANICAL - Helps create products and systems to benefit mankind.

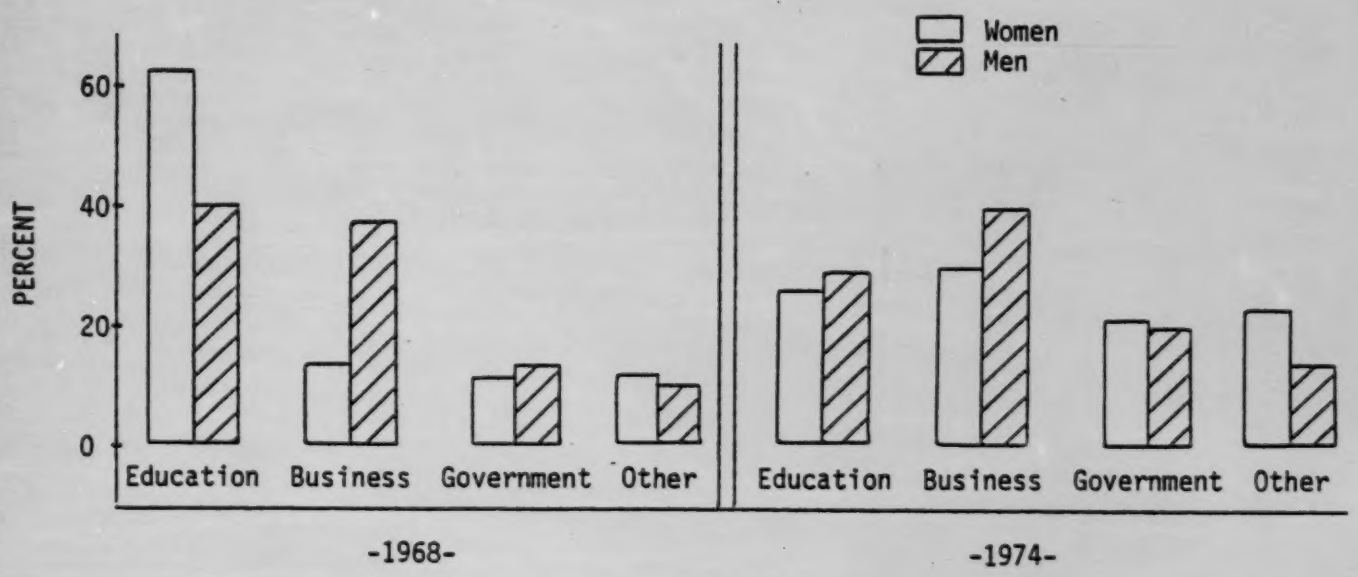
METALLURGICAL - Concerned with producing and applying to useful purposes metals and many other familiar materials.

MINING AND MINERALS - Devoted to the locating, mining and processing of minerals from the earth.

NUCLEAR - Combines scientific knowledge of nuclear reactions and radiation with engineering principles to produce heat, power and special nuclear products.

Table 1

DISTRIBUTION OF MEN AND WOMEN IN SCIENCE
BY MAJOR TYPE OF EMPLOYER: 1968, 1974



SOURCE: National Science Foundation

In 1968, over 60% of women were employed in education while only about 15% were employed in business; by 1974, the percent of women employed in education was reduced substantially, and the employment of women had increased in private industry and the government.

Table 2

WOMEN'S PARTICIPATION IN THE 1974 LABOR FORCE
BY EDUCATIONAL ATTAINMENT

Educational Attainment	% in Labor Force
8th Grade	Over 26%
High School	Approximately 50%
4 Yrs. of College	Over 60%
5 or More Yrs. of College	Nearly 70%

SOURCE: U.S. Department of Labor, Bureau of Labor Statistics

Note that the percentage of women in the labor force increases with increasing educational attainment.

Table 3

EMPLOYMENT OF SCIENTISTS AND ENGINEERS, BY SEX: 1974

	Total Number Employed	Percent Male	Percent Female
Total	1,662,000	94	6
Physical scientists	156,000	90	9
Mathematical scientists	45,000	84	15
Computer specialists	122,000	83	17
Environmental scientists	44,000	95	4
Engineers	999,000	99	1
Life scientists	136,000	87	13
Psychologists	61,000	75	25
Social scientists	100,000	87	13

Note: Detail may not add to totals because of rounding.
SOURCE: National Science Foundation, Manpower Characteristics System.

In 1974 women constituted almost 40 percent of the employed labor force, but only about 6 percent of the employed scientists and engineers.

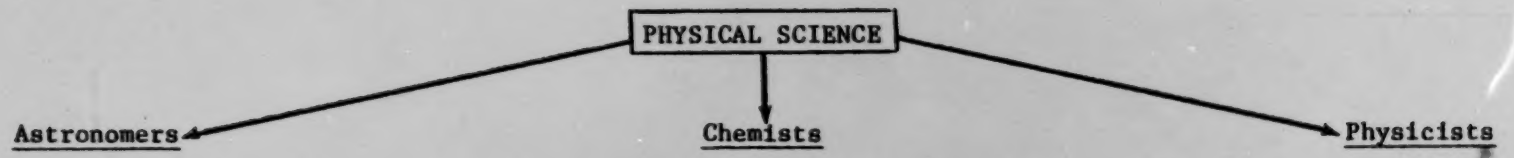
It is important to realize that these general categories may obscure some differences. For example, while 13% of social scientists are women, very few economists (6%) are women while a relatively large percentage of psychologists (25%) are women. On the other hand, women are greatly underrepresented in all areas of engineering.

Table 4

ALTERNATIVE CAREER CHOICE SUGGESTIONS IN SCIENCE

Field of Science	Traditional Career	Other Career Options
MATHEMATICS	Mathematics Teacher, Professor	Computer Programming, Systems Analysis, Engineering
BIOLOGICAL SCIENCE	Biology Teacher, Professor, Nursing	Research and Development, Forestry, Environmental Studies
PHYSICAL SCIENCE	Chemistry or Physics Teacher	Research and Development, Product Development, Astronomy, Meteorology, Oceanography, Geology, Engineering

Women graduating in the various areas of science have traditionally become teachers or nurses. They need to aim toward the nontraditional careers which now need and are seeking women.



-Seek answers to questions about the fundamental nature of the universe.

-7% of them were women in 1974.

-Usual requirement is a Ph.D. degree.

-Keen competition for the few available openings. Employment expected to grow slowly.

-Search for and put into practical use new knowledge about substances.

-10% were women in 1974.

-BA, BS with major in chemistry or related discipline sufficient for many beginning jobs.

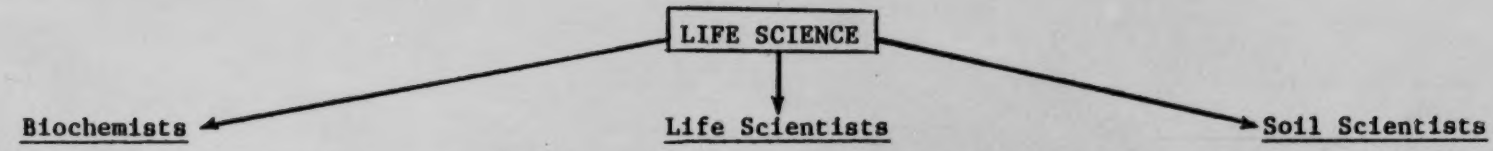
-Employment opportunities expected to be good. New jobs will be created each year.

-Through systematic observation and experimentation, they describe in mathematical terms the structure of the universe and interaction of matter and energy.

-4% were women in 1974.

-Graduate training in physics is almost essential for most entry-level jobs in physics and for advancement.

-Employment opportunities expecte to be good through the 1980's and more openings should appear each year.



-Study the chemical behavior and chemical nature of living things.

-Nearly 25% of those receiving advanced degrees in biochemistry in recent years have been women.

-Many beginning jobs require advanced degrees; entry jobs such as research assistants or technicians can be obtained with a bachelor's degree in biochemistry, chemistry, biology, etc.

-Employment opportunities should be favorable through the 1980's.

-Study all aspects of living organisms, emphasizing the relationship of animals and plants to their environments.

-About 20% of all biological and agricultural scientists were women in 1974.

-An advanced degree should be looked toward; bachelor's degrees are adequate for some beginning jobs but promotion is limited without advanced training.

-For those with advanced degrees, the employment outlook is good; those with lesser degrees may experience competition for available jobs.

-Study the physical, chemical and biological characteristics and behavior of soils.

-Bachelor's degree with major in soil science or closely related field is desired.

-Demand is increasing for soil scientists, particularly in the Federal Government.

CONSERVATION

Foresters

-Protect the environment by making sure that our forests are properly used.

Range Managers

-Manage, improve and protect range resources.

-Bachelor's degree in related field is usually required.

-Employment outlook expected to be good.

Soil Conservationists

-Provide technical assistance in the conservation of soil and water.

* * *

MATHEMATICS

Mathematicians

-Create new theories as well as translate scientific and managerial problems into mathematical terms.

-About 25% of them were women in 1974.

-Advanced degree is necessary for many jobs but the bachelor's degree is adequate for many positions in private industry and the Federal Government.

-The number of people seeking employment is expected to exceed the job openings; keen competition can be expected.

Statisticians

-Devise, carry out and analyze surveys and experiments, and interpret their numerical results.

-About 33% of them were women in 1974.

-Minimum requirement is usually a bachelor's degree with a major in statistics or mathematics; or a major in an applied field, minor in statistics.

-Faster than average growth is expected for persons who combine training in statistics with knowledge of a field of application.

COMPUTER SCIENCE

Programmers

-Outline steps a computer must take to solve a problem using the language developed especially for computers.

-About 25% of programmers in 1974 were women.

-Degrees in various fields are acceptable for employment: physical science, mathematics, engineering, and computer science.

-Employment is expected to grow rapidly.

Systems Analysts

-Plan efficient methods of processing data and handling the results.

-About 10% were women in 1974.

-Degrees in business, accounting, economics, mathematics, computer science, or engineering may be required depending on the employer.

-Employment is expected to grow rapidly.

* * * *

UNIVERSITY TEACHING

-About 25% were women in 1974.

-For initial appointment, a master's degree is usually required.

-Keen competition is expected through the 1980's.

ENGINEERING

-Develop supplies, design machines, develop scientific equipment, and supervise construction; solve the problems for urban living, industry, space, rapid transit and the consumer by working with specialists in various fields.

-Bachelor's degree in engineering, natural science or math are common starting points.

-Employment opportunities for engineers are expected to be excellent since the number of new graduates is expected to fall short of the number needed to fill openings.

ENVIRONMENTAL SCIENCE

Geologists

-Study the structure, composition, and history of the earth's crust in order to locate natural resources, give warnings of natural disasters, and insure that buildings are constructed on firm foundations.

Geophysicists

-Study the composition and physical aspects of the earth and its electric, magnetic, and gravitational fields.

Meteorologists

-Describe and try to understand the atmosphere's physical composition, motions, and processes, and determine the way these elements affect the rest of our physical environment.

Oceanographers

-Use the principles and techniques of natural science, mathematics, and engineering to study oceans; they help develop practical methods for forecasting weather, developing fisheries, mining ocean resources, and improving national defense.

-Approximately 10% of geologists and meteorologists (5% of oceanographers) were women in 1974.

-Bachelor's degree in geology, geophysics, meteorology, a related field science or engineering is adequate for entry into most jobs.

-Employment opportunities are expected to be good for geologists, excellent for geophysicists, and favorable for meteorologists with a bachelor's degree and very good for those with advanced degrees.

SOCIAL SCIENCE

Anthropologist

-Studies people; their orgins, physical characteristics, customs, languages, traditions, and material possessions and their social relationships and value systems.

20% are women; the leading one in the world is a woman: Margaret Mead

Liberal arts degree needed to prepare for graduate work; Ph.D. necessary for many jobs.

Limited opportunities and those available will present keen competition to those seeking them; particularly for those with less than a Ph.D degree.

Economist

Works with the relationship between supply and demand for goods and services

6% are women

major in economics or a related social science or math. A Ph.D.is required for top positions

Jobs will be very competitive through the 1980s.

Geographer

Studies the physical characteristics of the earth, its terrain minerals soil, water, vegetation, climate

15% are women.

Graduate work is required.

Outlook for employment is favorable through the 1980s.

Psychologist

Studies the behavior of individuals and groups and tries to help individuals achieve satisfactory personal adjustments.

25% are women

Majors in psychology, sociology, anthropology or education to prepare for graduate work in psychology. Masters degree required for most practical work; Ph.D. required for research and teaching.

Good opportunities in school psychology through the 1980s.

Political Scientist

Studies the government, how it works and why.

10% are women

Majors in political science, government, history or economics as preparation for graduate work. Master's degree needed for most beginning jobs and a Ph.D. is required for career level jobs with the federal government.

Employment opportunities very competitive in college teaching. Well-qualified women will find better chances for jobs with the federal government.

Sociologist

Studies the behavior and interaction of people in groups.

About 13% are women.

Majors in any social science. Ph.D. required for a career in sociology.

Jobs in college are competitive; employment is expected to improve in the 1980s.

Excerpted from: I Can Be Anything: Careers and Colleges for Young Women, Joyce Slayton Mitchell, College Entrance Examination Board, New York, 1975.

EXAMPLES OF SCIENCE CAREERS

INSTRUCTIONS: Match the examples of science and technology careers with the titles of people who perform these jobs by placing the correct letter to the left of each example.

I. Engineering

_____1. Designs and supervises the manufacture of computers, televisions, etc.

_____2. Scales up the laboratory process for making gasoline out of coal to industrial production

_____3. Designs and develops Skylab and other space vehicles

_____4. Develops high-strength, light-weight alloys for use in car bodies

_____5. Designs and supervises construction to make sure buildings in high risk areas meet earthquake safety standards

II. Physical Sciences and Mathematics

_____1. Studies the structure, composition, and history of the earth's crust

_____2. Deals with the collection, analysis, and interpretation of numerical data

_____3. Tries to understand and predict weather patterns

_____4. Determines the molecular structure and properties of newly synthesized organic compounds

_____5. Plans efficient methods of processing large amounts of data

_____6. Develops mathematical models of physical phenomena such as gravity

III. Biological Sciences

_____1. Collects and analyzes samples of marine life

_____2. Studies the inheritance of traits from one generation to another

_____3. Investigates the structure and functions of plants

_____4. Studies the functions of organisms, for example how the human body reacts to space travel

_____5. Cultures and analyzes bacteria and other small organisms

IV. Social Sciences

_____1. Analyzes production, distribution and consumption of goods and services

_____2. Tests job applicants to determine if they fit the personnel needs of a large company

_____3. Studies the origin of man

V. Interdisciplinary

_____1. Studies the effect of the mind on body functions

_____2. Deals with the proteins and other compounds involved in the processes of living things

_____3. Investigates the effects of chemical pollutants on living systems

JOB TITLES

I. Engineering

A. Aeronautical Engineer
B. Chemical Engineer
C. Civil Engineer
D. Electrical Engineer
E. Metallurgical Engineer

II. Physical Sciences and Mathematics

F. Chemist
G. Computer Systems Analyst
H. Geologist
I. Meteorologist
J. Physicist
K. Statistician

III. Biological Sciences

L. Botanist
M. Geneticist
N. Microbiologist
O. Oceanographer
P. Physiologist

IV. Social Sciences

Q. Anthropologist
R. Economist
S. Industrial Psychologist

V. Interdisciplinary

T. Biochemist
U. Environmental Scientist
V. Psychophysiologist

Classroom/Seminar Module #3

Profiles of Women Scientists

I. INTRODUCTION

One of the assumptions underlying this program is that high school girls are more concerned about the relation of spouse, home, and family to career pursuit rather than problems directly involved in pursuing a particular career. The purposes of this module are to provide evidence of women who have combined family lives and successful careers in a variety of ways.

II. ACTIVITY

Descriptions of job activities and some personal information about a number of women scientists are provided, as well as slides which illustrate women scientists at work and with their families. The profiles can be used to illustrate a number of points, including:

1. Women scientists work in a diversity of settings.
2. There is no such thing as a "typical" woman scientist; they represent a diversity of ages, races, and life styles.
3. There is no one path followed by all women in science careers. Some grew up knowing they wanted to be scientists; some switched from other careers; others did not have any careers at all until their children were grown.
4. Some women scientists are single, some married without children, others with children. Some work part-time, sharing responsibilities with their husbands and/or housekeepers.

SAMPLE PROFILES OF WOMEN SCIENTISTS

1. Marlene Williamson is a geophysicist at the Smithsonian Astrophysical Observatory. Her research involves the development of computer programs for studying properties of the earth from satellite tracking data. Says Dr. Williamson, "When I got my Ph.D. in 1970, my daughter was a year old and I finally had to face the question that everyone had been asking me for years: How am I going to combine a career in science with raising a family? My answer was to find a part-time job. I still work only four days a week because I like to be home Wednesdays with my children.
2. After starting out to major in home economics, an "appropriate" field for a woman, Reatha King discovered that she preferred the challenge of chemistry and chemical research. Luckily, her teachers at Clark College in Atlanta encouraged her to become a chemist. She went on to get a Ph.D. in physical chemistry from the University of Chicago, to work as a research chemist at the National Bureau, and to teach at York College of the City University of New York where she is now Associate Dean for Academic Affairs.
3. Carolyn Leach was born and raised in Louisiana. After college she trained as a medical technologist and worked in that field for a year. While she enjoyed the laboratory work, she was always finished with her work in half a day. She became restless in a job that didn't occupy and challenge her completely.

   Ms. Leach decided to pursue her interest in human physiology, and earned a Ph.D. in that field. She then went to work for NASA studying how the human body reacts to space travel.

   Now married, Dr. Leach and her husband are both continuing their careers and sharing the responsibilities of raising their young daughter. How does she manage to continue such a demanding career while raising her daughter? "My husband is very helpful, and I have a good housekeeper. Sometimes it's hectic, but it can be done."

4. Some women indicate that their children have benefited from the fact that they are working because the father takes a more active role in the family. Says Martha Beach, Vice President of an engineering company, "I didn't travel until about four years ago, except for an occasional conference. Now I travel a great deal. But this is something I work out with my husband. He stays home and he's gotten to know his children and the children have gotten to know him."

5. Most women scientists agree that their lives are anything but boring. Merna Villarejo is an Assistant Professor of Biochemistry at the University of California, Davis. She says, "My work includes teaching, research, administrative responsibilities, and student advising. Since most days include some time spent in each of these activities, my days fall into two categories: good days, which are challenging and varied, and bad days which are terribly hectic."

6. Angela Little received a bachelor's degree in bacteriology in 1940, a master's degree in food science in 1955, and a doctoral degree in agricultural chemistry in 1970.

   Says Dr. Little, "I earned the Ph.D. degree late in my career in order to qualify for a faculty appointment, but I never was unemployed for a single day except for time out to have a baby or to continue my formal education."

   "The difficulties of being a woman in this field are the usual ones--sex discrimination, lack of mobility if married, child care if small children are involved. None of these problems have proved insurmountable as far as I am concerned, but they do demand high energy output and dedication to one's goals and commitments."

7. Working out ways to combine careers and home lives can be quite challenging. Linda Kirschner and her husband delayed having children until she was well established in her career as a computer programmer. When their daughter was born, Ms. Kirschner began to work only three days a week. She recently increased to four days a week.

Says Ms. Kirschner, "My husband and I have spent the last four years trying to work out the logistics of having a two-career family and being parents at the same time." Fortunately, she says, programming pays well enough so they can afford to pay for excellent child care.

8. Working in science-related jobs during the summers can give you an opportunity to see if you enjoy this type of work. Donna Kuroda started working at the Goddard Space Flight Center during the summers between her sophomore and junior years in college. Her contribution to the space program was condensing data from an Explorer satellite. Now 33, she recalls that "it was pretty exciting back in the early 1960's, just as the satellites were going up. You knew what was happening right now!"

   Donna is now working as a Physical Science Administrator at the Environmental Protection Agency. She is also active in efforts of the American Chemical Society to increase hiring of minority group scientists, especially women. "Some of the big companies are interested in having more women in higher positions," she says. "I feel that women should really push to get into the scientific areas, because their chances are much better than they used to be."

   Dr. Kuroda plays tennis and jogs in her spare time, and she and her husband, a Xerox employee, run a small business growing and selling plants. But handling many kinds of house plants is a lot of work, and after their daughter was born in 1975, the Kurodas decided to specialize in cacti since they do not require so much care and attention.

9. Minority women who choose to enter science careers sometimes feel they are fighting to break a double barrier. Gwendolyn Albert studied engineering at Stanford University. It was her first experience in a predominantly white school, and for many of her classmates, it was their first experience with a black female scientist.

Says Ms. Albert, "Sometimes people doubt my abilities at first when they see I'm a black and a female. But I've always been completely accepted as a professional engineer once they see how good my work is."

Ms. Albert is now employed as an environmental engineer with the U.S. Army Corps of Engineers in Texas. Her job is to find out about water supply needs in the Southwest; here she is shown explaining a reservoir system being proposed for her current study area. One of the reasons she likes her work, says Ms. Albert, is that "other people will actually use the results of my studies. My work will have an impact on how communities develop."

10. The theme of helping people is one that appears often in discussions with women scientists. Aida Khalafalla is a biophysicist. She devised a machine which studies human functions based on the electrical properties of body tissues. "One of the uses I am most happy about is a test it can perform for unborn babies. When a woman is ill and must take medication late in pregnancy, there is danger to the baby. Tests must be done to make sure the baby is all right. Previously the only way to do these tests was very painful for the mother and dangerous to the unborn baby. But with this new machine, the tests can be done safely and painlessly."

11. Some people find that their jobs provide an opportunity to combine areas that interest them. Christine Shadle has a bachelor's degree in music and a master's in electrical engineering. Her work at Bell Telephone Laboratories includes music synthesis and programming in speech and communications, thus giving her an opportunity to combine her scientific career with her interest in music.

12. Sometimes a science career can come about almost by accident. Judy Joye began her career in oceanography with an interest in scuba diving, and that interest developed by pure chance. She was at a party and heard someone say, "When you wear a face mask, you can see as clearly underwater as you can on land." Next vacation, Judy decided to try skin diving, fell in love with it, and eventually became a professional diver. After a while she became interested

in doing more serious work and began to study oceanography. While she still does a lot of diving as an oceanographer, the purpose of her dives has changed. "Instead of untangling a line from a boat's propeller so that its owner can win a boat race, I collect samples of marine life for pharmaceutical companies that are trying to find cures for many diseases, including cancer. The possibility of developing a whole new family of antibiotics through this study of marine organisms is an exciting goal."

13. It is becoming increasingly common for women to seek careers as their children grow older and less dependent on them. One woman scientist said, "When my two children were ages 6 and 9, I realized that I needed something else in my life. I loved being home with my children when they were very young, but now they were both in school and had interests of their own outside the home. I was still young and was suddenly facing a life with a lack of purpose. My husband and I decided we could afford to have me go back to school for a master's degree. That was eleven years ago. I now have a master's degree in psychology and am working as an industrial psychologist for a large textile company. My job is to study the needs of the company and then to interview and test job applicants to find out if they are suited to those needs.

    There have been some problems finding time to meet all of the demands of my home and job, but we've worked them out. I think I'm a more interesting person and a better wife and mother than I would have been if I'd stayed home watching television all day. My youngest child is getting ready to go off to college in the fall, and believe me, having two good salaries in the family is quite a help with the costs of college these days."

14. Another woman, who graduated from college twenty years ago, returned to night school after marrying and raising a family to get a degree in industrial engineering.

15. One of the more unusual stories I have come across is that of Dr. Virginia Trimble, an astronomer at the University of California. She earned money for college by reading television scripts for "The Twilight Zone," checking for scientific accuracy. (She also did exotic dancing in an Egyptian restaurant, but that's another story.) Anyway, Dr. Trimble recently married Dr. Joseph Weber, a physicist at the University of Maryland. The arrangement they have worked out to combine their careers with marriage is as follows: Half of the year they both work in California, and the other half they work in Maryland—clearly a creative solution to a difficult problem.

16. Women scientists can make it to the top. You have all heard of Margaret Mead, one of the world's foremost anthropologists. Juanita Kreps, an economist, is currently Secretary of the Department of Commerce, and Nancy Roman, Chief of Astronomy in NASA's Office of Space Science, is one of the nation's top scientists working in the space program.

    Another woman scientist who has held a high government post is Dr. Betsy Ancker-Johnson. Dr. Ancker-Johnson has had a long, varied, and highly successful career as a physicist, including teaching at the University of California at Berkeley, and conducting research for Sylvania, RCA, and Boeing corporations. In 1973, she was appointed Assistant Secretary of Science and Technology in the Department of Commerce. In this capacity she had policy control of 6 bureaus with 7,500 staff members and a budget of $200 million.

    Born Betsy Ancker, she married Dr. Harold H. Johnson, and chose the name Ancker-Johnson as her last name so that people who read her earlier research papers would not get confused when they saw her work after she married.

Dr. Ancker-Johnson describes herself as follows: "Born and raised in an ordinary middle-class family in the midwest, married, and the mother of four children. In other words, subtract physics from my life and I'm indistinguishable from the average American woman, whatever that is."

She and her husband have four children, who, she says, are growing up with sexual equality. "Both the boys and girls get to empty garbage, make beds, cook, wash dishes, wash cars, help repair their bikes, ski, kayak, back-pack, learn Aikido, etc."

WHAT STEPS CAN YOU TAKE TO PLAN A SUCCESSFUL CAREER?

You probably have many ideas about careers you would like to consider.

The steps below can help you begin to explore some of the possibilities.

STEP 1

Take yourself seriously and decide to plan responsibly for your own future. Think about how you want your career to fit into the life you want. As you do, try to picture yourself in careers you may not have considered before, as well as in those you have already thought about.

STEP 2

Become an expert on yourself. Explore your interests and abilities. Ability tests and interest inventory results are one way to begin. See about these at the counseling center of your school or college. If you took the ACT or SAT, check your score report.

STEP 3

Find out about some of the many career opportunities which are open to you. Don't limit yourself to the outdated lists of "women's careers." Consider all possibilities. Consult the references Look for up-to-date information about specific careers. Talk to women in science and technology careers. Learn about why they chose careers that in the past were unusual for women. Write to professional associations. Watch for TV shows, speakers, and conferences about these fields, too. You might become interested in a career you have never dreamed of, if you knew something about it.

STEP 4

Learn what is required to succeed in each of the careers you consider. Talk to counselors and advisors who are particularly interested in helping young women explore the full range of career possibilities. Ask them to help you find out about the kinds of training and education you will need. Write to colleges for program information.

STEP 5

Begin to prepare early for your career. Be sure to take courses in high school and college that keep your options open. Enroll in summer science programs offered by colleges and universities, while you are still in high school. These programs can give you some idea of what a career in science is like. Look for part-time jobs, summer employment, or volunteer activities to help you explore the world of work. Career options develop out of experience.

STEP 6

Don't restrict yourself as you begin to make decisions about your career. Consider *all* the careers that interest you and for which you can qualify. Women today and tomorrow will be leading full lives, engaging in a wide range of careers, enjoying a variety of family life styles, and helping as equal partners in the search for a better world.

STEP 7

Set your own goals and learn how to work for them. Keep a strong image in your mind of what those goals are. Work toward your goals with the idea of success in your mind. Many women are successful and happy in challenging and interesting careers. You can be too!

STEP 8

Take charge of making decisions for your own life and career. Assert your own ideas about what is the best career for you, whether it is in science or technology or some other area. You know best what your abilities and interests are. Others can help you explore your options, but don't let anyone else decide for you. Keep your dreams alive and make the best ones come true!

1/ From Women in Science and Technology: Careers for Today and Tomorrow, 1976. Reprinted with slight modifications with permission from the American College Testing Program.

ARE YOU READY TO BEGIN?

Become an Expert on Your Own Career Choice

Can you say yes to all these statements?

I can imagine what it would be like in one or more careers in science and technology.	☐
I understand that women's career options are expanding.	☐
I understand some of the reasons why more young women haven't considered science and technology careers.	☐
I can distinguish the *myths* about women in professional careers from the *realities*.	☐
I have some ideas about new and exciting careers in science/technology.	☐
I recognize characteristics of young women who are likely to become scientists or technologists.	☐
I can imagine what it might be like to be a career woman in a formerly "male field."	☐
I understand that women in science and technology have many different personal life styles.	☐
I am planning, step by step, for a successful career.	☐

Find Out More about Careers

Here are some leads to specific information about careers. Ask your librarian about them.

Carlson, Dale. *Girls Are Equal Too: The Women's Movement for Teenagers.* New York: Atheneum, 1973.

Hopke, William E., Ed. *Encyclopedia of Careers and Vocational Guidance.* 3rd ed. Vol. 1, *Planning Your Career.* Vol. 2, *Careers and Occupations.* Chicago: J. G. Ferguson, 1975.

Mitchell, Joyce Slayton. *I Can Be Anything: Careers and Colleges for Young Women.* New York: College Entrance Examination Board, 1975.

Occupational Outlook Handbook. Washington: U.S. Government Printing Office. Revised every 2 years.

Occupational Outlook for College Graduates. 1974-75 ed. Washington: U.S. Government Printing Office.

Seed, Suzanne. *Saturday's Child: 36 Women Talk about Their Jobs.* Chicago: J. Phillip O'Hara, Inc., 1973.

Leaflets, briefs, pamphlets describing occupations. Most libraries keep these materials in folders and file them alphabetically or according to groups of similar jobs.

Classroom/Seminar Module #4

Scientists Work on Solving Societal Problems

I. INTRODUCTION

The solution of many societal problems involves specialists from a number of science disciplines. The purposes of this activity are: (1) to help students become aware of the diversity of career opportunities in science and technology, and (2) to demonstrate the social utility of science and technology careers.

II. ACTIVITY

1. Tell the students: Many of the most pressing problems the world is facing have aspects which need to be addressed by science and technology. For example,

   How can we produce enough food for the world's rapidly growing population? Can we develop higher-yielding crops? Are there herbicides and pesticides which can help us to produce more good without disturbing the balance of nature?

   How can birth defects be prevented?

   Do emotional illnesses have underlying biochemical causes? Can we prevent these problems with the proper hormone and enzyme treatments?

   What can be done to develop new sources of energy to replace our rapidly dwindling supplies of fossil fuels?

2. Start with a problem that you suggest, such as the Energy Crisis, and have the students generate a list of scientists and what each might do in solving the problem. You can encourage the class to generate their own problems and then list types of scientists and roles, or you can use the following examples.

Example 1 - Energy Crisis

1. Chemist - Work out basic chemical processes needed for more efficient use of crude oil and other fuels.
2. Chemical engineer - Determine feasibility of using these processes on a large-scale basis; implement procedures if feasible.
3. Physicist - Study reactions involved in nuclear energy, solar energy.
4. Computer Scientist - Computer control of atomic reactors; networks for power distribution; computer controlled heating/cooling systems.
5. Geologist - Locating areas which are likely to be good sources of energy.
6. Meteorologist - Advice in locating solar generating facilities, windmills, etc.; predicting needs for energy resources.
7. Electrical engineer - Design generating stations, power plants.
8. Civil engineer - design dams.
9. Mechanical engineer - Design more fuel-efficient automobiles.
10. Mining engineer - Developing cost-effective means for mining impure ores.
11. Economist - Allocation of scarce energy resources.
12. Psychologists - Studying means for encouraging conservation.

Example 2 - Heart problems

1. Immunologist - means to prevent rejection of heart transplants
2. Biomedical engineer - design of artificial hearts; heart lung machine; pacemaker
3. Mathematics - image processing; using pictures of heart for diagnosis
4. Biochemistry - blood chemistry
5. Psychologists - life adjustments; coping with stress
6. Physicist - power supplies for pacemakers
7. Geneticist - predicting cases where heart problems are possible.

Example 3 - Space Travel

1. Astronomer - orbits; solar flares
2. Physicist - orbits; thrust needed
3. Aerospace engineer - designs systems to implement physicists' plans
4. Chemists, chemical engineer - fuels; air cleaning systems
5. Biochemist - life support systems
6. Electrical engineer - design electrical system
7. Computer scientists - control systems; communication
8. Mathematician - solve equations involved in orbiting, docking
9. Meteorologist - weather satisfactory? high altitude winds
10. Mechanical engineer - rocket design
11. Geologist - analyze soil samples
12. Biologist - search for evidence of life on other planets

Example 4 - Crime

1. Biochemist - analyze bood samples for persons, etc.
2. Electrical engineer - design alarm systems
3. Sociologist - crime prevention, rehabilitation
4. Psychologist - character traits associated with crime
5. Anthropologist - cultural variations in crime
6. Computer Scientist - fingerprint networks; police dispatching
7. Economics - costs of crime

Classroom/Seminar Module #5

Attitudes Toward Careers for Women — Male/Female Differences

I. INTRODUCTION

Several studies have shown, not surprisingly, that males are less willing than females to accept the idea of women in traditionally male careers. The purposes of this activity are: (1) to assist students in exploring their own attitudes toward the abilities and aspriations of women; and (2) to help students become aware of the attitudes held by others.

II. ACTIVITY

1. Hand out the list of 12 statements. Tell them these are only a few items from a large survey questionnaire which dealt with a wide variety of attitudes and behaviors, not just those related to careers for women.
2. Ask each student to predict the percent of high school males and the percent of high school females who agreed with each statement in a recent national study.
3. Then ask the students to go back and asterisk the statements they personally agree with.
4. Ask a volunteer to give "males agree" and "females agree" predictions for the first statement, and why they think the numbers will be that way. Ask if anyone sees it very differently, and if so, what are his/her predictions and why.
5. Give the actual results for that statement, have the students write the numbers in the appropriate columns, and ask what that tells us about male-female attitudes.
6. Continue with the other statements in the same fashion.
7. End by raising the questions: How much have things changed in the last 25 years or so? Do you think the results would have been very different if the survey had been of your parents' generation when they were in high school? How?

RESULTS OF A NATIONAL SURVEY OF HIGH SCHOOL STUDENTS, 1975[1/]

	Statement	Male	Female
1.	A woman's place is in the home.	23	12
2.	Women are as interested in mathematics as are men.	55	72
3.	Men don't like to work for women supervisors.	48	53
4.	Women should stick to "women's jobs."	25	12
5.	Women have as much science ability as men do.	63	78
6.	Education is wasted on women since they usually get married and raise a family.	12	5
7.	Women have the ability and endurance to make successful space flights.	32	54
8.	Working women take jobs away from men.	25	11
9.	According to the latest Census data, equal job opportunities have now been achieved.	21	25
10.	I strongly approve the election of women as governors.	27	54
11.	I approve of appointing a woman as chairman of the Atomic Energy Commission.	24	45
12.	I would choose for myself the best qualified dentist available regardless of sex.	70	81

1/ From Erlick, A. C. & LeBold, W. K. Factors influencing the science career plans of women and minorities. Purdue Opinion Poll No. 101, 1975, B-36-36.

RESULTS OF A NATIONAL SURVEY OF HIGH SCHOOL STUDENTS, 1975[1/]

Statement	Predicted Percent Agree		Actual Percent Agree	
	Male	Female	Male	Female
1. A woman's place is in the home.	1.		1.	
2. Women are as interested in mathematics as are men.	2.		2.	
3. Men don't like to work for women supervisors.	3.		3.	
4. Women should stick to "women's jobs."	4.		4.	
5. Women have as much science ability as men do.	5.		5.	
6. Education is wasted on women since they usually get married and raise a family.	6.		6.	
7. Women have the ability and endurance to make successful space flights.	7.		7.	
8. Working women take jobs away from men.	8.		8.	
9. According to the latest Census data, equal job opportunities have now been achieved.	9.		9.	
10. I strongly approve the election of women as governors.	10.		10.	
11. I approve of appointing a woman as chairman of the Atomic Energy Commission.	11.		11.	
12. I would choose for myself the best qualified dentist available regardless of sex.	12.		12.	

1/ Erlick, A. C. & LeBold, W. K. Factors influencing the science career plans of women and minorities. Purdue Opinion Poll No. 101, 1975, B-36-36.

WHY ARE SO FEW WOMEN IN SCIENCE AND TECHNOLOGY CAREERS

1. Women may not be aware of the variety of available science careers.

2. Women may feel that they should adjust their career goals in order not to interfere with their husband's success because they feel that the husband's success is more important.

3. Women may not feel free to move to new locations as career opportunities open up in their field.

4. Women may not feel competent enough in math and science areas or feel they lack the natural ability to be scientists.

5. Senior high school women may be discouraged from pursuing the science and math courses which would prepare them to pursue science majors in college.

6. Women with math and science ability may feel that they do not have the same educational and employment opportunities as men.

7. Women may avoid careers because they fear the consequences of being highly successful.

8. Women may feel that a long-term commitment to a science career interferes with marriage and family responsibilities.

9. A woman's family and friends may believe a woman's place is in the home and may not think it is appropriate for her to pursue a career.

Prepared By The

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As Part Of The

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Classroom/Seminar Module #6

Barriers to Participation of Women in Science Careers

I. INTRODUCTION

A number of factors seem to operate to prevent women from pursuing careers in science and technology. Some of these are real (e.g., absence of role models, various types of discrimination), and others are perceived as real but are in fact mythical (girls are less capable than boys). The purposes of this activity are: (1) to help students become aware of barriers which have inhibited women's pursuit of traditionally male science careers; and (2) to explore ways of dealing with these barriers.

II. CLASS ACTIVITY

1. Hand out list of statements and ask students to indicate the most important barriers to women pursuing traditionally male careers.
2. Ask for show of hands on each one; then assign the barriers with the largest number of "votes" to major categories:

   a. Conflict between wife and/or mother role and professional career role -- women feel that their basic responsibility is raising children and a long term commitment to a career would interfere; women feel that a husband's success is more important than a wife's success, and women should adjust their career goals in order not to interfere with husband's success.

   b. Expectations of family and/or friends -- conflict with pursuing a professional career.

   c. Lack of opportunities for women in science -- women are discouraged from taking high school science and math courses and are therefore not prepared to pursue science majors in college; women are not as aware as men of the variety of available science careers or job openings in these areas; there is discrimination against women in getting educational and employment opportunities (e.g., women have difficulty getting into medical school).

d. Women have a fear of success.

e. Women lack natural abilities to be scientists, or feel lacking in competence in these areas.

f. Women lack professional support--they are out of the mainstream of important professional contacts.

3. Discuss ways in which these barriers can be overcome. For example:

a. Creative career/home arrangements.

b. Decide what is important to you and do it; ignore your friends and family.

c. Get adequate high school and college preparation; pick fields which have projected opportunities; affirmative action will do the rest.

Classroom/Seminar Module #7

Role Conflict

I. INTRODUCTION

One of the major barriers to participation of women in science careers appears to be the perception that such a career cannot be successfully combined with a satisfying home life. The purposes of this activity are: (1) to illustrate the types of conflict which might be anticipated; (2) to help students become aware of their assumptions about the roles of husbands and wives; (3) to help students explore ways of solving conflicts or preventing them from arising in the first place.

II. ACTIVITY

1. Hand out case study.
2. Give students 10 or 15 minutes to answer the questions.
3. Ask for volunteers to give answers to A. After 3 or 4 have spoken, ask how many thought:
   a. The woman would alter her plans to begin her professional training either because a husband's career success is more important or because the woman should remain at home to care for the young child. The husband will go ahead with his new career plans because a man should be happy and successful in a career.
   b. The husband and wife will stick to their original commitments and plans, thus allowing the woman to pursue her professional education.
   c. Both the husband and will will adjust their plans and commitments in some way, for example both will attend school parttime and share child-rearing.
   d. No resolution is possible; the marriage will end in divorce.
4. You may want to tell them the percent of women college freshmen who came up with each alternative in a study at the University of Kansas: a. 60%; b. 15%; c. 13%; and d. 8%.

4. If this activity is used in the seminar, you may have very few people who expect the woman to adjust her plans. You may wish to read them some of the comments made by women in the University of Kansas study.

> "Ann should decide whether she wants to be a mother or career woman; it is impossible to be both."
>
> "Anne, being a mother and wife, that should be her first concern, not what she wants. She should stay home with the child, anyway."
>
> "Anne should also realize that to build a rounded family life a mother must be amother. Meaning she raises the children she brought into the world."
>
> "In my belief, a woman obeys her husband. If his plans exclude her plans to have an occupation, she must accept his decision, if she truly is a woman and loves her husband."
>
> "After all, if her husband is supporting her adequately and making a good home for her, she could have no better, more honorable occupation than being a housekeeper."

5. Ask for suggestions about how the conflict might have been avoided. After a few have given ideas, ask how many included:

(42%)[1/] a. Delay marriage

(49%) b. Delay having a child

(49%) c. Wife could have started her professional education earlier

(24%) d. The husband should have planned his career earlier or better

---

1/ Numbers in parentheses refer to responses in the University of Kansas Study. Total is greater than 100% since many students gave more than one suggestion.

Case Study: Please read this story and answer the questions at the end.

Anne and Allan Johnson have been married for four years and they have one child, Jamie, age 2 1/2. Anne and Allan met while both of them were in high school. Allan was 2 years older than Anne and when he graduated he went immediately into the service. When he was discharged two years later, they were married and then immediately moved across the country so Allan could attend college. While Allan was in the service, Anne had worked as a sales clerk in her father's store. Currently Allan is attending college and also working to supplement the support the GI Bill provides. He is majoring in business and hating it. Recently he decided that he really wanted to be an engineer and, with only one year of school remaining to complete his Business degree, wants to switch majors, although that would necessitate another 3 years of college. Anne, who has not been working at all since Jamie was born, is quite disappointed. She and her husband had agreed that after he had completed college, she would be able to begin the professional training she desired which would require her to be a full-time student in a 4-year program. An intense feud rages.

A. Now finish the story -------- What will happen to Allan and Anne?

B. What kind of suggestions can you make as to what steps Anne and Allan could have taken to prevent this conflict?

Reprinted from Smith, W. S., Stroup, K. M., & Coffman, B. M. Career Exploration Project for High School Senior Women. Kansas: Emily Taylor Resource and Career Center for Women, 1975.

Classroom/Seminar Module #8

Importance of Science and Mathematics Prerequisites

I. MODEL STATEMENT AND RESOURCE

The trend is for a greater and greater percent of women to enter the work force and to work for an increasing number of years.

- Childbearing patterns have changed. Earlier marriage and fewer children mean that the average mother of today has at least 40 years of life ahead after her youngest child is in school;
- 9 out of 10 girls will marry;
- 8 out of 10 will have children;
- 9 out of 10 will be employed outside their homes for some period of their lives;
- At least 6 out of 10 will work full-time outside their homes for 30 years or more.

Some girls will plan on working from an early age and prepare for a career while many others will decide to work later based upon newly discovered interests or practical realities: some will find their families need the extra income, and it is estimated that 4 of every 10 women will become heads of families because of divorce or the death of their husbands.

Given these realities, it is important that young women prepare themselves for entering the job market. Too often, those women who decide to enter the work force later in life, or who are forced to enter it, have not prepared themselves adequately and are forced to accept secretarial and clerical positions even though they have the capabilities and aptitudes to succeed at other jobs, including careers in science and technology.

Times have changed. Recent federal laws prohibit discrimination in education and employment; it is now illegal for an organization to discriminate on the basis of sex in salaries, fringe benefits, promotions, sick leave, or any other conditions of employment. Also, recent experience has proven that women can successfully perform jobs traditionally filled by men. Many schools and companies now have affirmative action plans and are actively

recruiting women. Careers in science and technology are included amongst those that are being opened to qualified women at an ever-increasing rate. Many of these jobs are exciting, worthwhile jobs with good pay and offer a chance for growth within strong companies.

A person does not have to be a genius to perform these jobs. An interest in your surroundings, an inquisitive nature, a desire to help humanity and the ability to solve problems are all very important, as well as an interest and capability in the specific activities of the job. However, even though a woman does not have to be a genius in science and mathematics to pursue most of these careers, she does need to have educational experiences in science and mathematics to qualify for many kinds of jobs. Far too often, young women in high school and college, who have been fully capable of successfully mastering a solid background in the basics of science and math, have failed to do so because they did not think seriously about the eventuality of having to find a career or because they thought science and mathematics careers were reserved for men. Many of these women have found that this oversight has either cost them a chance at an interesting, worthwhile career or caused them to have to spend valuable time and money in catching up on basic math and science skills that could have been mastered in high school through a better choice of courses.

The need for a strong background in math and science will seem obvious to the young woman who decides during her sophomore year in high school to attend college and become an engineer or chemist. But it wont't be obvious to her classmate who assumes she will graduate from high school, get married within a couple of years, and either be supported by her husband's income or work to supplement that income as a secretary or clerk. She may find out at the age of 20 that there are many good jobs available in computer programming for those who complete a local training program. But she finds that even though her friends have easily mastered the training program and been hired, she cannot qualify for training because she never bothered to take algebra. She either has to give up the opportunity or go to adult education classes to take algebra before entering training.

And it may not be obvious to the very bright young girl who decides to become an elementary teacher without exploring the full range of available careers. She takes only the absolute minimum amount of math and science

even though she does not dislike these courses and does very well in them. During her junior year in college, she develops an avid interest in astronomy and decides to become an astronomer. She is able to make the switch in college majors and she succeeds in becoming an astronomer, but only after taking extra courses in college math, chemistry and physics to make up for her weak background. Also, while she is making up for these deficiencies, she is having to compete in astronomy courses with students who are way ahead of her in terms of science and math backgrounds.

Facts and examples like these show that young women today should not fail to consider the real possibility that they can enter and succeed at a full range of science and technological careers. ey also show that young women should prepare themselves, just as young men should, for entering a changing job market in which many exciting jobs require a strong background in basic science and mathematics.

II. AVENUES TO CLASS DISCUSSION

- Do any of you know young women who have finished high school and now wish they had taken more science and math? Tell us about that situation.

- Have any of you (girls) not taken math or science course because you see no need at all? because you thought that's for boys?

III. USE OF PERSONAL EXPERIENCES

- Should be embellished, where possible, with personal anecdotes of some women who lost an interesting opportunity or who had to undergo remediation because of a lack of background in basic math and science.

- Could be embellished by discussion of prerequisite needs in science and mathematics courses to get some nonspecialized jobs in woman scientist's area.

Classroom/Seminar Module #9

Steps to Plan a Successful Career

I. BRIEF ACTIVITY: HANDOUT

This sheet showing the 8 steps in planning a career could be used as a handout near the end of the class or seminar, with very little comment or discussion. The students could be given time to read it and a chance to ask questions. Or, it could be handed out as a closing activity so that interested students would have it available for information.

II. EXPANDED ACTIVITY: ELABORATION/DISCUSSION

This handout could be used as the focal point for (1) providing more factual information, (2) relating personal experiences, or (3) opening areas of discussion. Some specific examples follow:

A. Step 1 is an appropriate entry point for presenting a personal anecdote about a woman scientist who has risen to a very high position and handles the responsibilities of life and home very well or one who has a job with an unusual component, such as foreign travel or heavy travels while maintaining a family. The point would be that traditional barriers can be overcome, and young women should not limit their career aspirations based upon those barriers. (This can also be related to Step 6.)

B. Step 5 is an appropriate entry point for a summary of some of the information included in Module #8.

C. Step 6 is a good entry point for an extension about emerging careers and prerequisite science and mathematics background. The following is a model of a paragraph that might be stated:

Advance planning for your career is very important and to be encouraged. At the same time, be careful in high school and undergraduate college not to limit yourself completely. For instance, prepare yourself for a general field like geology but be careful not to tie up all of your interests and specific experiences in specific tasks, such as field mapping. Many jobs that you would get ready for now may not be in existence when it is time for you to begin work or your interests may change somewhat. Our technology changes the job market as years go by. Some jobs no longer need to be done, but others become needed which were never necessary before. If you become too specific in your plans too early in your education, you may be preparing for a job that may not be there when you are ready. But a strong background in basic science and mathemathics will help you prepare for many existing and emerging jobs.

An example of a job or career which is now highly visible that was not present or visible a few years ago could be presented, especially if it is in the women scientist's area.

D. Avenue for Discussion

- Have any of you explored career options in the sciences through the school, family, or community? Please relate your experiences.

- Are any of you planning to be a woman scientist in an area that might surprise those who think women cannot hold certain jobs? What career? How do you plan to handle the travel? Being one of a few women? Taking care of a family, etc.?

Classroom/Seminar Module #10

Skills and Interests for Science Careers

I. INTRODUCTION

It is probable that many high school girls have not considered careers in science and technology because they believe they are lacking in the abilities necessary for success in these fields. The purposes of this activity are: (1) to help students become aware of the variety of skills which are useful in science and technology careers; and (2) to help female students who have these skills and interests realize that they may be suited for science careers.

II. ACTIVITY

1. You might want to start off with an anecdote.

   > At age 14, a girl told her mother she wanted to help people and thought she would become a nurse. The mother said, "Why a nurse? You don't like to take orders. If you're interested in medicine, why not become a doctor?"

   Females often have the skills and interests needed for success in science and technology careers, but do not aspire to these careers because they are not aware that they have the necessary skills.

2. Ask the students to suggest skills, attitudes, and interests which you need to succeed in a science career.

3. Tell them that many people think you have to be a genius to succeed in a career in science and technology but this isn't true. Then read them quotes from some practicing scientists about the skills needed in their fields.

   > "A sense of adventure and a desire to help humanity is what it takes for a career as a scientist or technologist."
   >
   > " Engineering requires intelligence, stamina, and stubborness, but it doesn't require genius in math or science."

"Gender doesn't matter. A scientist or technologist can be 100% feminine and still do the job well."

4. Hand out the "Science-related Capabilities" sheet and ask the students to put a check in the appropriate column for each.

5. Tell the students:

> Items on the inventory are all qualities that practicing scientists have to some degree. Those people who have studied vocational interest have found that if your interest have found that if your interests are similar to someone in a particular field who enjoys their job, you too will probably be satisfied with that type of work. These items are not requirements for being a scientist, but if you've checkad at least ten on the left side of the line, you may want to consider what this indicates.

If you are curious about why and how events occur, if you like to see how things work, if you like challenges and take pride in performing tasks well, you might want to consider a career in one of the many science-related fields.

SCIENCE-RELATED CAPABILITIES[1/]

Do I do these things well?	Yes	No
Solve mathematical puzzles		
Read maps		
Work independently		
Think through abstract problems		
Accept responsibility for tasks		
Do I like to do these things?		
Use tools or instruments		
See how things work		
Meet challenges		
Succeed		
Explore the unknown		
Do I have these resources?		
Background in science (at least 2 courses)		
Background in math (at least 3 courses)		
Ability and motivation to finish projects		
Curiosity about the physical world		
Tendency for creative and original ideas		
General academic ability		

	True	False
I do not like highly structured situations with many rules		
I do not like repetitive activities		
I do not easily accept conventional ideas and attitudes		
I do not need to experience the rewards for my work immediately		

1/ From Smith, W. S., Stroup, K. M., & Coffman, B. M. Career Exploration Project for High School Senior Women. Kansas: Emily Taylor Resource and Career Center for Women, 1975.

APPENDIX G

Student Questionnaire and Postcard

O.M.B. No. 099-S-7701
Approval Expires 5/31/8

VISITING WOMEN SCIENTISTS PROGRAM
STUDENT QUESTIONNAIRE

School _____ Date of Visit _____

1. Please indicate your grade.

(Circle one.)

Eight 1
Nine 2
Ten 3
Eleven 4
Twelve 5
Other (Specify) _____ . . 6

2. Please indicate your sex.

(Circle one.)

Female 1
Male 2

3. Please circle the meeting #. 1 2 3 4 5 6

4. How would you rate the class meeting overall?

(Circle one.)

Excellent 1
Good 2
Fair 3
Poor 4

5a. What did you like best about the program?

_____

_____

_____

_____

5b. What did you like least?

_____

_____

_____

_____

(OVER)

6. How valuable was the program to you in each of the following ways?

(Circle one on each line.)

	Not Valuable	Somewhat Valuable	Very Valuable
a. Taught me about a number of careers of which I hadn't been aware	1	2	3
b. Showed me that women can successfully combine careers and family lives	1	2	3
c. Taught me about the preparation needed for various science careers	1	2	3
d. Showed me the importance of keeping my options open by taking science and mathematics courses in high school	1	2	3
e. Encouraged me to seek further information about science career opportunities.	1	2	3

7a. Did you see a film about women and careers during the last several days?

(Circle one.)

Yes . . . . . 1 Go to Q.7b
No . . . . . 2 Go to Q.8

7b. Please indicate your rating of the film.

(Circle one.)

Excellent 1
Good 2
Fair 3
Poor 4

8. Has the Visiting Women Scientists Program raised any new questions for which you would like answers? If so, please specify.

_____

_____

_____

_____

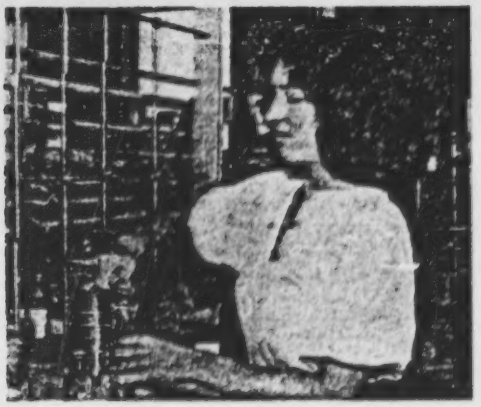
_____

_____

_____

THANK YOU FOR YOUR COOPERATION.

WOMEN IN SCIENCE AND TECHNOLOGY CAREERS



DID YOU KNOW THAT:

- 9 out of 10 women will work at some time in their lives.
- Even with a break in employment for marriage and children, the average woman worker will work for 25 years; many will work for as long as 45 years.
- The majority of working women are married, living with their husbands and families.
- It is now illegal to discriminate on the basis of sex in education and employment.
- Many schools and companies now have affirmative action plans and are actively recruiting women.
- There are opportunities for women in: *Engineering, mathematics, physical science, biological science, and social science.*

For more information, fill out, tear off, and mail the attached postcard. No postage is necessary.

Please send me the following information about the participation of women in careers in science and technology.

- ☐ Ways women can combine family life and a successful science career
- ☐ Job opportunities in science and technology for women in the future
- ☐ What it's like "on the job" in a science career
- ☐ What high school courses and college majors are required for science careers
- ☐ How educational expenses might be financed

Name: _____ Sex F ☐ M ☐

Address: _____

City: _____ State: _____ Zip Code: _____

School: _____

Grade: 8 ☐ 9 ☐ 10 ☐ 11 ☐ 12 ☐

APPENDIX H

Contact Person Record of Visit; Contact Person Questionnaires; and School Questionnaire for Extra Schoools

O.M.B. No. 099-S-77014
Approval Expires 5/31/82

VISITING WOMEN SCIENTISTS PROGRAM
SCHOOL CONTACT PERSON RECORD OF VISIT

Name _____ School _____

Title _____ Date of Visit _____

1. Approximately how much time did you spend in arranging for the visit? (Include time spent arranging the schedule, talking to teachers, corresponding with the visitors, etc.)

(Circle one.)

Less than 2 hours	1
2-5 hours	2
6-10 hours	3
More than 10 hours	4

2. It is important to the success of this program that the Field Representative (the visitor who worked with you in setting up the details of the program) be pleasant and courteous and do everything possible to ensure that the visit runs smoothly without inconveniencing the school. Please rate the Field Representative's performance in these regards, and add any other comments which you think will help us.

(Circle one.)

Excellent	1
Good	2
Fair	3
Poor	4

Comments:

(OVER)

3. Please describe any problems which were encountered in planning for and/or conducting the visit and how these problems were solved. Problems might include scheduling difficulties, equipment failure, student inattention, speakers couldn't be heard in the back of the room, etc. If there were no problems, please indicate that fact.

4. Would you be willing to act as contact person if your school decided to participate in the program at some future time?

(Circle one.)

Yes	1
No	2

5. Other Comments:

Please send this to RTI in the postage-paid envelope provided as soon as possible. Thank you for your cooperation.

O.M.B. No. 099-S-77014
Approval Expires 5/31/82

Visiting Women Scientists Program
School Contact Person Questionnaire

Name _____ School _____

Title _____ Date of Visit _____

Several weeks ago your school participated in the Visiting Women Scientists Program. We would like to enlist your aid in evaluating the impact of this program; you will probably need to consult with several of your colleagues in order to answer these questions.

1. Was the Visiting Women Scientists Program of value to your students?

(Circle one.)

Yes 1
No 2

2. The number of female students seeking information about science careers from guidance counselors since the program has been

(Circle one.)

More than the usual number for a similar period of time 1
About the usual number for a similar period of time 2
Less than the usual number for a similar period of time 3

3. Has the resource packet which was given to the guidance department been used? By whom?

(Circle all that apply.)

a) Students 1
b) Teachers 2
c) Counselors 3
d) Librarians 4
e) Administrators 5
f) Others 6

4. Have any films or other materials listed in the resource packet or annotated bibliography been ordered? Which ones? By whom?

_____

_____

_____

_____

_____

(OVER)

5. One or more classes in your school were visited by a woman scientist. Have there been any activities in these classes since the visit related to science career exploration? If so, please describe.

6. Is there any other evidence of the impact of the Visiting Women Scientists Program on students, teachers, counselors, and/or administrators? Please describe.

7. If the Visiting Women Scientists Program becomes an on-going program, would your school like to participate in the future?

(Circle one.)

Yes 1
No 2

Please send this to RTI in the postage-paid envelope provided as soon as possible. Thank you for your cooperation.

O.M.B. No. 099-S-77014
Approval Expires 5/31/82

Women in Science Careers
School Contact Person Questionnaire

Name _____ School _____

Title _____

Several weeks ago your school received a Resource Packet on women in science careers. We would like to enlist your aid in evaluating the impact of this packet; you will probably need to consult with several of your colleagues in order to answer these questions.

1. The number of female students seeking information about science careers from guidance counselors since the resource packet was received has been

(Circle one.)

a) more than the usual number for a similar period of time . . . 1
b) about the usual number for a similar period of time 2
c) less than the usual number for a similar period of time . . . 3

2a. Has the resource packet been used?

(Circle one.)

Yes	1	Answer Q.2b
No	2	Go to Q.3

2b. By whom?

(Circle all that apply.)

Students 1
Teachers 2
Counselors 3
Librarians 4
Administrators 5
Others 6

3. Have any films or other materials listed in the resource packet or annotated bibliography been ordered? Which ones? By whom?

Please use the back of this sheet for any comments you wish to add and return this questionnaire to RTI in the enclosed postage-paid envelope.

THANK YOU FOR YOUR COOPERATION.

O.M.B. No. 099-S-77014
Approval Expires 5/31/82

SCHOOL QUESTIONNAIRE

1. School Name _____

2. How many students are there in your school? _____

3. What is the enrollment by grade?

8	9	10	11	12	Special	Other

4. Which of the following best describes the location of your school?

(Circle one.)

A rural or farming community..... 1
A small city or town of fewer than 50,000 people that is not a suburb of a larger place..... 2
A medium-sized city (50,000-100,000 people)..... 3
A suburb of a medium-sized city..... 4
A large city (100,000-500,000 people)..... 5
A suburb of a large city..... 6
A very large city (over 500,000 people)..... 7
A suburb of a very large city..... 8

5. Approximately what percent of the students in your school are in each of the following categories? (Answers should total to 100%)

a.	White or Caucasian	a. _____
b.	American Indian	b. _____
c.	Black, Afro-American or Negro	c. _____
d.	Mexican American or Chicano	d. _____
e.	Puerto Rican	e. _____
f.	Other Latin-American Origin	f. _____
g.	Oriental or Asian American	g. _____
h.	Other	h. _____
		100%

6. How many students are there in your district? _____

7. Please provide the name and address of your district superintendent.

_____

_____

_____

_____

APPENDIX I

Woman Scientist Record of Visit,
Field Representative Evaluation Form,
and School Visit Record

O.M.B. No. 099-S-77014
Approval Expires 5/31/82

WOMAN SCIENTIST
RECORD OF VISITS

Name _____

Dates of Visits _____

1. Approximately how much time did you spend in preparation for the visits?

_____

2. How many schools did you visit? _____

3. It is important to the success of this program that the RTI Field Representative who accompanies the woman scientist be pleasant and courteous and that she does everything possible to ensure that the visits run smoothly. Please rate her performance in these regards, and add any other comments which you think will help us.

(Circle one.)

Excellent	1
Good	2
Fair	3
Poor	4

Comments:

4. Briefly describe the demonstration you prepared. Include a list of the equipment and materials you brought and a list of any which the school supplied.

5. If the Visiting Women Scientists Program is continued in the future, would you be interested in participating?

(Circle one.)

Yes 1
No 2

6. Do you have any suggestions for improving the Visiting Women Scientists Program? If yes, please specify.

(Circle one.)

Yes 1
No 2

Please complete this form and return it to RTI along with your invoice in the enclosed postage-paid envelope as soon as possible. Thank you for your cooperation.

VISITING WOMEN SCIENTISTS PROGRAM

FIELD REPRESENTATIVE'S EVALUATION

TRAINING

1) How valuable were the field trial visits (conducted before the training session) in preparing you for the actual program? Do you have suggestions regarding these visits in the future?

2) Do you feel that you were sufficiently familiar with the forms and procedures necessary for the program, after the training session? Do you have suggestions for improving future training sessions in terms of content, procedures, etc.?

MATERIALS

1) Please comment on each of the following modules. How often and in what instances did you use it? How much time did it take? How well did it work? Should it be retained for the future? Do you have suggestions for improving it?

° Woman Scientist Describes Aspects of Her Career and Her Life

° Definitions of Types of Science

° Profiles of Women Scientists

° Scientists Work on Solving Societal Problems

° Attitudes Toward Careers for Women -- Male/Female Differences

1) (Continued)

- Barriers to Participation of Women in Science Careers

- Role Conflict

- Importance of Science and Mathematics Prerequisites

- Steps to Plan a Successful Career

- Skills and Interests for Science Careers

2) What other materials might be helpful in future programs: for the field representative; for the schools; and for the woman scientist?

3) What kind of feedback did you receive regarding the "Women's Prejudice Film" from faculty and staff, and from students?

CONDUCTING VISITS

1) What types of meetings seemed to work best (e.g., small or large? all female? 10th graders? etc.)

2) What ideas can you offer for providing information to teachers and counselors in addition to, or instead of, the teacher-counselor meeting? Do you feel that teachers would use a set of the modules if they were left a copy of them after the visit? Which ones might be particularly useful?

3) What were the major problems encountered in conducting visits in the schools?

4) Are there any school concerns that were voiced that you feel should be taken into account in future programs?

SCHEDULING VISITS

1) How far in advance should schools be contacted about dates for the visit? How far in advance should the specific day be worked out?

2) Were schools reluctant to schedule all-female seminars? all-female large group meetings?

3) How well prepared do you feel schools were for the visits? Suggest any improvements you feel might be warranted.

WOMEN SCIENTISTS

1) What types of things do we need to find out about the women scientists before they are hired to visit schools?

2) How well prepared do you feel the women scientists were from the letter sent to them? Have you suggestions as to how the letter might be improved? Would in-person training be advisable?

3) What suggestions can you offer regarding accommodations, contacting, or traveling with the women scientists?

4) How do the women scientists feel about the circuit approach? Four days seem to be too much. Are three too many also? If the schools were geographically closer (making travel less of a problem), would four schools be too many?

5) From your work with a variety of women scientists, do you have any comments about the characteristics of those that are the most effective? For example, were women employed in industry more effective? younger women? etc.?

OTHER

1) Do you have suggestions regarding the submitting of invoices, etc.?

2) Do you have any suggestions for modifying the role of the field representative? Would it be possible to eliminate this role and have women scientists visit schools by themselves?

3) Any other comments?

THANK YOU FOR SHARING YOUR SUGGESTIONS AND INSIGHTS WITH US!

FIELD REPRESENTATIVE
SCHOOL VISIT RECORD

School _____ Date of Visit _____

Contact Person _____

Time Arrived at School _____ Time Left School _____

A. Film

1. Shown to _____ classes (or _____ students)

2. Mailed back to Sandler Films on _____

B. Counselor Meeting

Number of: Counselors_____ Librarians_____

Science Teachers _____ Math Teachers_____

Social Science Teachers _____

Others_____ (Specify) _____

_____

_____

C. Resource Packet Location: _____

NOTES:

(OVER)

D.

(Circle one.)
Color Postcards: Blue Buff

Meeting #	(Circle one.) Type of Meeting			Number of Postcards Distributed	
				10th Grade Females (a-b)	All Students (c-d)
	Class	Seminar	Large Group		
1	C	S	L	____	____
2	C	S	L	____	____
3	C	S	L	____	____
4	C	S	L	____	____
5	C	S	L	____	____
6	C	S	L	____	____
7	C	S	L	____	____
8	C	S	L	____	____
9	C	S	L	____	____
10	C	S	L	____	____
				Sum 10th Grade Females ____	Sum Total Students ____

(Record sums on "Summary of Circuit")

E. Describe any problems which were encountered during the visit and how these problems were solved. Problems might include equipment failure, student misbehavior, teacher not expecting visit, film not shown, etc.